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**SITE INVESTIGATION PLAN
FOR THE CLOSURE OF THE FLORENCE
COPPER IN-SITU MINE PROJECT**

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FLORENCE, ARIZONA**

JANUARY 10, 2007

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LIST OF ACRONYMS

μ S/cm	microSiemens per centimeter
A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AMA	Active Management Area
amsl	above mean sea level
APP	Aquifer Protection Permit
A.R.S.	Arizona Revised Statutes
ASLD	Arizona State Land Department
ASTM	American Society for Testing and Materials
AWQS	Aquifer Water Quality Standards
bgs	below ground surface
BHP	Broken Hill Proprietary Company, Ltd.
BTEX	benzene, toluene, ethylbenzene, and xylene
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COC	Constituent of Concern
EDR	Environmental Data Resources, Inc.
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System
GPL	Groundwater Protection Limit
gpm	gallons per minute
LBFU	Lower Basin Fill Unit
Ma	million years ago
MFGU	Middle Fine Grained Unit
mg/L	milligrams per liter
NPL	National Priorities List
pCi/L	picoCuries per liter
PLS	pregnant leach solution
POC	Point-of-Compliance
RCRIS	Resource Conservation and Recovery Information System
SMCL	Secondary Maximum Contaminant Level
SMRF	Self-Monitoring Report Forms
SPLP	Synthetic Precipitation Leaching Procedure
SRL	Soil Remediation Level
S.U.	Standard Unit
SX-EW	solvent extraction-electrowinning

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LIST OF ACRONYMS

TDS	total dissolved solids
TSCA	Toxic Substances Control Act
UIC	Underground Injection Control
UAU	Upper Alluvial Unit
UBFU	Upper Basin Fill Unit
USGS	United States Geologic Survey
UST	underground storage tank
VOC	volatile organic compound

1.0 INTRODUCTION

On behalf of Florence Copper, Inc. (Florence Copper), Brown and Caldwell has prepared this Site Investigation Plan for the Florence Copper In-Situ Mine Project (Site) as a component of the closure process required under the Arizona Department of Environmental Quality's (ADEQ's) Aquifer Protection Program and the U.S. Environmental Protection Agency's (EPA's) Underground Injection Control (UIC) program. In accordance with Arizona Administrative Code (A.A.C.) R18-9-A209.B.1, this Site Investigation Plan presents a detailed discussion of the investigative activities that have been conducted at the Site from 1995 to the present and describes current groundwater and soil conditions at the Site. The Florence Copper In-Situ Aquifer Protection Permit (APP) No. 101704 was signed and issued by ADEQ on June 9, 1997. Florence Copper requests that ADEQ review this Site Investigation Plan and provide comments prior to Florence Copper submitting the official closure notification letter and Closure Plan to ADEQ, pursuant to A.A.C. R18-9-A209.B.

1.1 PURPOSE AND SCOPE

The purpose of this Site Investigation Plan is to provide ADEQ with specific information about the investigative sampling and monitoring activities that have been conducted at the Site from June 1997 through the present. The completion of a Site Investigation Plan is mandated in the APP guidelines prior to the generation of a Closure Plan, even if no additional sampling is necessary. This Site Investigation Plan provides the following information:

- physical description of all facilities relative to the APP;
- summary of historical activities conducted at the Site;
- summary and discussion of ambient and compliance groundwater monitoring results; and
- summary of investigative activities, including inspections, sampling, and monitoring of pond water, sediment, and groundwater conducted at the Site.

Multiple documents have been generated and submitted to ADEQ regarding this Site since January 1996 (submittal date of APP Application) that have documented details of previous testing and compliance monitoring. The summaries in this report rely on the referenced documents in Section 7.0 for the details of the investigation activities. The data collected to date support Clean Closure of the Site without additional investigation activities.

2.0 SITE BACKGROUND

Portions of the Site history and discussion of activities summarized in this section have been condensed from information provided in the January 1996 APP Application for the Florence Copper In-Situ Mine. Information generated since submittal of the APP Application is included as appropriate. The reader is referred to the APP Application and additional references in Section 7.0 for details of the aspects summarized below.

2.1 SITE LOCATION

The Site is located in central Pinal County, approximately 2.5 miles northwest of the town of Florence. Figure 1 shows the general location of the Florence Copper project. The entire property owned and/or leased by Florence Copper or its parent company Vanguard Properties, Inc. consists of 5,550 acres, located in portions of Sections 27, 28, 33, and 34 of Township 4 South, Range 9 East. Included within the 5,550 acres is a 160-acre strip of land leased from the Arizona State Land Department (ASLD), the boundaries of which are outlined in purple on Figure 2. The area that includes the APP-permitted facilities (proposed ponds and in-situ mining area) is approximately 350 acres. The approximate areal extent of the mineable ore body, which is located within the boundaries of the pollutant management area (i.e., the Site), is 217 acres. For purposes of this Site Investigation Plan, the pollutant management area is defined, and shown on Figure 2, as the area encompassing only those facilities that were actually constructed and operated under the APP, plus all of the point-of-compliance (POC) wells.

2.2 SITE HISTORY

The ore body for which the Florence Copper in-situ mine was developed is known as the Poston Butte or Florence porphyry copper deposit. The first efforts to develop a mine at the Site began in 1969. From 1969 to 1977, Continental Oil Company (Conoco) drilled over 500 exploration boreholes. These boreholes were used to obtain geological, geophysical, hydrological, metallurgical, and engineering data. Conoco developed an underground mining feasibility study and underground mining began on December 29, 1974, and ended on December 23, 1975. An average production rate of approximately 250 tons per day was achieved with mined ore being transported by haul trucks for pilot plant processing. Slightly greater than 5,400 feet of drifts were developed during mine operation, resulting in approximately 31,700 tons of oxide ore, 16,900 tons of sulfide ore, and 1,500 tons of waste rock.

Conoco abandoned the property in 1977 as a result of the low grade, water infiltration problems, large proposed capital investment costs, and low copper prices. All mining equipment, rail, piping, pumps, and electrical service was removed from the mine and shaft following the termination of mining operations. When salvaging was completed, the mine was allowed to flood and surface facilities were dismantled.

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In 1992, Magma Copper Company (Magma) purchased over 8,000 acres of land, and leased the 160 acres from the ASLD, in the area northwest of the town of Florence for the purpose of evaluating and potentially developing a mine. Magma commenced a pre-feasibility study of the Florence deposit in January 1993, which focused on identifying the most appropriate mining technology for developing the oxide portion of the deposit. The two methods that were evaluated were open-pit mining followed by heap leaching, and in-situ solution mining followed by solvent extraction-electrowinning (SX-EW) to produce copper cathode. The feasibility study concluded that in-situ solution mining followed by SX-EW was the preferred method to develop the Florence deposit. Numerous exploration boreholes were drilled within the Florence deposit during the pre-feasibility study to verify and supplement previous subsurface data generated by Conoco.

Magma began evaluating mine design, environmental permitting, and facility engineering in 1994 and advanced the project to the construction stage. In-situ mining technology was selected because the ore deposit is located several hundred feet beneath the surface of the groundwater. The depth of the ore deposit and the highly productive overlying aquifer prevented the deposit from being developed by conventional underground or open pit methods. To remove the copper, Magma proposed installing 2,000 wells within a 200-acre area. The wells would be used to alternatively inject dilute sulfuric acid solutions (raffinate) into the ore deposit for the purpose of dissolving the copper and recovery of the copper-bearing acidic solutions to the surface, where they would be processed.

The development and operation of the in-situ mine required an APP from ADEQ and both an Aquifer Exemption and a Class III UIC permit from EPA. The development of the permit applications and supporting information required extensive geochemical, groundwater flow, and contaminant fate and transport modeling over the wide range of hypothetical conditions which could reasonably be anticipated during the projected 15-year operating life and 30-year post-closure monitoring period. Column tests (bench scale degradation studies and treatability studies) were used to demonstrate that the aquifer could be rinsed following cessation of operations such that the quality of the groundwater would be restored within a reasonable period of time. Geophysical, hydrologic, and groundwater quality data to support the models and studies for the permit applications were obtained from 89 wells installed to depths ranging from 180 feet to 1,578 feet below ground surface (bgs).

On January 19, 1996, Magma submitted the APP Application for the Site to ADEQ and the application for a UIC permit to EPA. Also in January 1996, Broken Hill Proprietary Company, Ltd. (BHP) of Australia acquired Magma and hence, ownership of the Florence Project was transferred to BHP. After notice and public hearing, EPA issued a Class III UIC Permit (No. AZ39600001) on May 1, 1997. ADEQ issued an APP (No. P-101704) for the construction, operation, and closure of the in-situ copper mine on June 6, 1997.

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At the time the APP (No. P-101704) was issued in June 1997, the Florence Copper In-Situ Mine represented cutting-edge mining and environmental technologies. It was reported to be the first "green field" in-situ copper mining project in the U.S., and one of the first, if not the first, in-situ mine to receive a Class III (area-wide) UIC permit and Aquifer Exemption from EPA.

2.2.1 Hydraulic Control Test

The APP and UIC permits required BHP to conduct and successfully complete a hydraulic control test before it could begin full-scale operation of the permitted facilities. The test involved small-scale injection and recovery of dilute sulfuric acid and was conducted from late October 1997 through early February 1998. The objective of the test was to verify that hydraulic control (an inward hydraulic gradient) could be maintained within a small portion (approximately 1 acre) of the ore body. The test utilized four injection wells, nine recovery wells, seven observation wells, and one evaporation pond. The locations and construction data, including the total depth, casing diameter, screened interval, and aquifer screened for each of the test wells used in the hydraulic control test are listed in Table 1. To ensure a valid test, the acidic solutions injected during the test were similar in composition to the solutions that were to be injected during normal mine operations.

The hydraulic control test was conducted by BHP between October 31, 1997, and February 8, 1998 and included the following activities:

- injection of approximately 120 to 130 gallons per minute (gpm) of dilute sulfuric acid into the copper oxide deposit via four injection wells (BHP-6 through BHP-9) screened in the copper oxide deposit;
- recovery of approximately 160 to 170 gpm of pregnant leach solution (PLS) from the nine recovery wells (BHP-1 through BHP-5 and BHP-10 through BHP-13), also screened in the copper oxide;
- collection and analysis of PLS samples; and
- monitoring and recording water levels within the area of injection to document an inward hydraulic gradient.

The PLS recovered during the hydraulic control test was collected and evaluated for copper concentrations before being piped from the well field to a double-lined evaporation pond (the only evaporation pond constructed on the Site) where samples were collected and evaluated for copper concentration. Injection and recovery rates were monitored along with electrical conductivity and water levels throughout the test in order to demonstrate that hydraulic control could be established and maintained during the injection of sulfuric acid solutions into a portion of the ore body for which the aquifer exemption had been granted. The test was successful as described in a letter report dated April 6, 1998, from BHP to ADEQ APP Compliance Section.

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Injection of the acidic solution ceased at the close of the test and BHP commenced mine block restoration activities in accordance with Part II.H.2 of the APP and Part II.I.1 of the UIC permit. Restoration activities, which involved rinsing the mine block by injecting and recovering formation water, continued up to September 2004. Rinsing of the mine block was conducted at a rate sufficient to maintain hydraulic control until the quality of groundwater met limits specified in the APP and UIC permits. Injection wells were permitted to be used as recovery wells and vice-versa during the restoration to facilitate the rinsing of the ore body/aquifer. Approximately 30,000 to 40,000 gallons of water per day was pumped from the well field. Groundwater pumped from the recovery wells was pumped to the evaporation pond.

2.2.2 Recent Activities

In early 2001, Merrill Mining purchased 5,550 acres of BHP holdings for commercial and residential development. Merrill Mining later purchased all stock of Florence Copper and assumed control of BHP's remaining 3,200 acres, located south of Hunt Highway, which included the Florence Copper In-Situ Mine. The APP and UIC permits were then transferred to the new owner, Florence Copper, a wholly owned subsidiary of Merrill Mining. Neither Merrill Mining, nor Florence Copper, has conducted any in-situ mining operations at the Site. Florence Copper is requesting, through submittal of this Site Investigation Plan and the subsequent Closure Plan, that ADEQ approve the Site for Clean Closure.

2.2.3 Hydraulic Cessation

In April 2004, the *Proposed Cessation of Hydraulic Control at the Florence Project In-Situ Test Field, Florence Copper* (Brown and Caldwell, 2004) was submitted to ADEQ. Florence Copper requested permission from ADEQ and EPA to discontinue hydraulic control in order that a water quality test could be conducted in accordance with Part II.H.2 of the APP and Part II.I.2 of the UIC permit.

On August 24 and 25, 2004, ADEQ and EPA authorized Florence Copper to discontinue hydraulic control so that the testing could be completed. Pumping was discontinued on September 1, 2004, and groundwater samples were collected in December 2004 to evaluate water quality after the 90-day equilibration period had elapsed. The pumping wells have remained off since.

Florence Copper submitted a report (Brown and Caldwell, 2005) to ADEQ and EPA that detailed the results of the final post-hydraulic control sampling event and requested approval to permanently discontinue hydraulic control. Additional verification results for two wells were submitted to both agencies in a letter dated June 17, 2005. The EPA has since approved the request to discontinue hydraulic control (EPA, 2005).

2.3 APP PERMITTED FACILITIES

There are five categories of facilities listed in the Florence Copper APP that are specifically authorized for construction and operation:

- in-situ mining area injection and recovery wells;
- one raffinate pond;
- one PLS pond;
- one run-off pond; and
- eight evaporation ponds (plus one standby pond).

The raffinate pond, PLS pond, run-off pond, seven of eight evaporation ponds, and the standby pond were never constructed. Only one evaporation pond was constructed; as per Part II.C.2. of the APP, it is double-lined with a leak collection and recovery system. The pond footprint covers an area of approximately 13 acres. It is located in the southeastern corner of the pollutant management area, as shown on Figure 2.

For the purpose of conducting the hydraulic control test, 20 wells (injection, recovery, and observation), and the evaporation pond, were constructed as specified in the APP. All groundwater and leachate pumped from the test wells were collected by pipes and directed to the evaporation pond. The well field used in the hydraulic control test is located in the lower central portion of the pollutant management area (Figure 2). The locations of the individual test wells are shown on Figure 3. The construction of each of the test wells is discussed below in Section 3.5.2 and summarized in Table 1. Summary tables presenting all of the analytical results for all of the mine block test wells are included in Appendix A.

The APP designates 31 POC monitor wells, the locations of which are shown on Figure 2. The construction of each of the POC wells is discussed below in Section 3.5.2 and summarized in Table 1. Most of the POC monitor wells have water quality data dating back to 1995. A detailed discussion of the water quality sampling at the Site is presented below in Section 4.0. Summary tables presenting all of the analytical results for all of the POC wells are included in Appendix B.

2.4 APP EXEMPT FACILITIES

The following facilities are not subject to APP regulations:

- Pipelines and tanks are exempt from APP regulations pursuant to Arizona Revised Statutes (A.R.S.) §49-250.A.22. A small tank farm is located beside the evaporation pond which, during testing, contained sulfuric acid and sodium hydroxide. A site inspection conducted in September 2006 showed no evidence of leakage or spills from any on-site pipes or tanks. Photographs from the September 2006 site inspection are included in Appendix C.

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- Mine-related facilities that have not been used for mining purposes since 1986 are excluded from APP regulations pursuant to A.R.S. §49-201.7(a). Located east of the eastern boundary of the pollutant management area, in Section 27, is an area previously owned and operated by Conoco during its exploration, mine development, and pilot plant activities in the 1970s. This area is shown on Figure 2 and was designated as Area 1 in the *Closure and Post-Closure Plans* (Brown and Caldwell, 2001b). Facilities on the Conoco site consist of a mine shaft and headframe, change house, ore processing equipment (crushers, vat leach), solvent extraction (SX) area, and various administrative and warehouse buildings. There are also several pole-mounted electrical transformers located at the Conoco mine site.
- Facilities or structures unrelated to mining activities, which include farm houses, corrals, storage sheds, farm roads, or abandoned/non-functional equipment, and located outside of the pollutant management area.

3.0 PHYSICAL CHARACTERISTICS

3.1 CLIMATE

The climate in the region inclusive of the Site is typical of a semi-arid desert region with low precipitation and low humidity. Average maximum temperatures for the town of Florence range from 66.4 degrees Fahrenheit (°F) in January to 105.5°F in July; average minimum temperatures range from 37.3°F in January to 74.9°F in July. Rainfall is seasonal with peaks in winter and summer (Western Regional Climate Center, 2006). Winter rainfall occurs from December to March and is generally lighter than the summer thunderstorms, occurring during July and August. Summer rains are sporadic and heavy, and may cause flooding. Average annual precipitation for the town of Florence is 9.95 inches, based on recordings from 1892 to 2005. The mean relative humidity ranges from about 12 percent in the summer to about 32 percent in the winter.

3.2 TOPOGRAPHY

The Site is located within the Sonoran Desert section of the Basin and Range physiographic province of south-central Arizona. The last major tectonic event left a topography of deep basins surrounded by mountain ranges. The basins are now sediment-filled valleys, and the mountains are low and rugged. The Santan and Sacaton Mountains lie to the west/northwest of the Site; the Superstition Mountains are located to the north; and the Tortilla Mountains are located to the southeast. Poston's Butte is located adjacent to the northern perimeter of the Site.

The Gila River traverses the region from east to west and lies between the Site and the town of Florence. The braided riverbed meanders through a broad valley averaging 2 to 3 miles in width near the town of Florence. The Site is located on gently sloping terraces of the Gila River, north of the active 100-year floodplain, as defined by the Federal Emergency Management Agency. Due to upstream control and diversions, the Gila River is generally dry, with the exception of brief flow following intense seasonal rainstorms and releases from upstream dams.

North of the town of Florence, the valley floor slopes approximately 20 feet per mile to the southwest. Westward from Florence, the valley slopes to the west approximately 10 feet per mile. Elevations in the vicinity of Florence range from 1,520 feet above mean sea level (amsl) at the southeastern edge of the town to 1,470 feet amsl along the northwestern edge of the town. The Site itself is relatively flat; elevations range from approximately 1,465 feet amsl in the southeastern corner to 1,475 feet amsl in the northwestern corner. Three alluvial terraces constitute breaks in the topographic slope in the Site area.

3.3 CURRENT AND REASONABLY FORESEEABLE USES OF LAND AND WATER

Much of the property owned by Florence Copper is currently not in use for any purpose. Land use on the Florence Copper property, outside of the pollutant management area, has primarily consisted of agriculture; however, future development for residential, commercial, or industrial purposes is planned given the proximity to the Hunt Highway, Gila River, and town of Florence. Continued use of the Site (within the pollutant management area) and/or areas to the north for agriculture is planned and the expanding development of urban areas will discourage agricultural use in the foreseeable future. The potential for future usage of the Site for mining purposes is speculative based upon the minimal interest registered from mining entities since the in-situ testing was concluded. The land leased from the ASLD in the northern portion of the Site may be developed for any of the purposes cited above, or retained as undeveloped land.

There is no current usage of groundwater or surface water at the Site. The primary uses of groundwater in wells located around the Site are for agriculture, industrial, or domestic purposes. Table 1 provides a list of the known wells located on and within ½-mile radius of the Site; in addition, Table 1 provides construction data and well uses for each well. The most likely future use of groundwater at the Site would be associated with urban development or agriculture and would entail construction of production wells. The location and depths of construction for production wells would be constrained at the Site due to the shallow depth of bedrock and the inferred targets for water extraction. As discussed in Sections 3.5.1 and 3.5.4 below, the highest yields of water in the vicinity of the Site are obtained from alluvial units above the bedrock. Installation of production wells into bedrock would be more difficult due to the drilling conditions and the expected yields would be significantly lower than in the surrounding alluvium. In addition, the drawdown produced by pumping at the Site resulted in measurable changes in the groundwater gradient (Section 3.5.3). Pumping from wells constructed for domestic, industrial, or agricultural use, and that are located in areas where the alluvium is substantially thicker, have not produced similar effects on the groundwater. If potential future uses of groundwater require the installation of production wells, then the most logical (and productive) locations would be in thick alluvial units outside of the Site boundary.

The Site contains no significant sources of surface water that could be used for any of the purposes discussed above. Surface water drainages are ephemeral and there are no man-made impoundments constructed to retain water. Currently, the evaporation pond is the only impoundment at the Site that retains water for any extended time period and it will be closed as part of the APP closure process. The North Side Canal is located across the Site and is used to convey water from the Gila River. If the land is developed for agricultural use, then the North Side Canal may be modified to distribute water for irrigation.

There are no other significant structures, areas of soil contamination, or impediments to future development on the Site.

3.4 GEOLOGY

The Site is located in an area with a complex geologic history that includes rocks and structural features formed over a period of time spanning from the Precambrian to the mid-Tertiary. Successive inundation, compression, and expansion of the crustal rocks over this period of time resulted in a number prominent structural features and geochemical characteristics that are the very reason that the Florence Copper In-Situ Mine was proposed at this location. A brief description of the geologic history of the Site and the resulting geologic conditions are described below.

The early Precambrian crust that stretched across the area of the Site area was formed by alternating volcanic activity and sedimentation. The early Precambrian crust was re-worked by thrust, reverse faulting, and large scale folding associated with the Mazatzal Orogeny (1,670 million years ago [Ma]) that resulted in the accretion of several metamorphic tectonic assemblages represented in central and southeastern Arizona (Anderson, 1989).

The Mazatzal Orogeny was followed by a tectonically quiet period during which the Oracle Granite batholith was emplaced (Anderson, 1989). It is the Oracle batholith that serves as host to the mineralization that constitutes the ore deposit which was the focus of the Florence Copper In-situ Mine.

The Grand Canyon Disturbance (900-800 Ma) resulted in uplift and tilting of the crust, resulting in extensive intrusion of diabase sills and dikes intruding into the Oracle Granite, and the formation of extensive northeast trending structural lineaments (Elston and McKee, 1982).

No significant tectonic activity occurred in the vicinity of the Oracle Granite until the Laramide Orogeny began in late Cretaceous time (about 80 Ma). It was during the Laramide Orogeny that the Oracle Granite was intruded by granodiorite and quartz monzonite dikes which were accompanied by hydrothermal mineralization (Dickinson, 1989). Continued Laramide activity produced faulting and uplift that resulted in the erosion of Paleozoic and Mesozoic sedimentary sequences and exposure of the Precambrian intrusive bodies.

As the uplifted topography eroded, a sedimentary sequence was deposited over the exposed Precambrian surfaces at lower elevations. Tertiary age sediments are not thought to be present in the vicinity of the Site due to continued erosion during this period.

During the Basin and Range Orogeny, the last major orogenic event to affect the western U.S., the older sediments were overlain by locally derived clastic deposits. Basin and Range faulting and tilting in the general region resulted in north-northwest trending horst and graben structures bounded by normal faults with large displacements (Nations and Stump, 1981). The Florence orebody occurs on a complex horst block of the Oracle Granite and metamorphic rocks, bounded on the east and west by grabens.

Post-Basin and Range sediments were subsequently deposited over the bedrock/orebody surface. The sediments consist of unconsolidated to moderately well-consolidated interbedded clay, silt, sand, and gravel in varying proportions and thicknesses with interbedded basalt flows on the west and northwest portions of the in-situ mine area. Recent floodplain alluvium occurs along the Gila River channel, and tributary washes in the general area. This alluvium is composed of unconsolidated silt, sand, gravel, and boulders (Eberley and Stanley, 1978).

3.4.1 Structural Features

As a result of regional stresses that occurred throughout the late Precambrian and into the early Paleozoic time, east-northeast trending structural lineaments formed in the western continental crust (Anderson, et.al., 1971). One such structure occurring in the Florence area is the Ray Lineament, which trends north 70 degrees east and extends approximately 50 miles from the Sacaton Mountains to the Pinal Mountains. The Ray Lineament crosses through the Florence Copper pollutant management area. Many east-northeast trending Laramide-age (80 to 50 Ma) intrusive bodies were emplaced in central Arizona at the intersections of existing zones of weakness. The Laramide Orogeny resulted in reactivation of older normal faults and produced large northeast-trending vertical block uplifts (Anderson, et al, 1971). The subsequent Basin and Range Orogeny imposed northwest trending normal faults on this already complex structural setting.

The Party Line fault, a major normal fault located on the east side of the orebody horst block strikes north 35 degrees west, and dips 45 to 55 degrees toward the southwest. This fault has been reported to have a vertical displacement of more than 1,000 feet. A series of en-echelon faults striking north-south to northwest lie west of the Party Line fault (Conoco, 1976). These faults form the transition from the horst in which the orebody occurs to the graben, west of the orebody.

The Sidewinder fault is a north-south trending normal fault located on the west side of the orebody with a displacement of more than 1,200 feet (Conoco, 1976). Additional en-echelon north to northwest trending normal faults east of the sidewinder fault form the transition from the orebody horst to the bounding graben on the east side.

3.5 HYDROGEOLOGICAL CONDITIONS

The Florence Copper site is located at the northern edge of the Eloy sub-basin of the Pinal Active Management Area (AMA), and is approximately 2.5 miles south of the southern edge of the Eastern Salt River Valley sub-basin of the Phoenix AMA. The Arizona Department of Water Resources (ADWR) has divided the groundwater-bearing materials of the Pinal AMA into four main hydrogeologic units, in descending order: the upper basin fill unit (UBFU), the middle fine-grained unit (MFGU), lower basin fill unit (LBFU), and the bedrock (Hammett, 1992).

3.5.1 Hydrogeologic Units

The hydrogeologic units in the Eloy sub-basin are described in the ADWR hydrologic map report (No. 23) for Pinal AMA (ADWR, 1992). The UBFU consists of primarily unconsolidated to slightly consolidated, interbedded gravels, sands and silt with some finer grained materials occurring in lenses. The UBFU forms a significant aquifer throughout the area and is analogous to the Upper Alluvial Unit (UAU) in the Phoenix AMA.

The finer-grained MFGU generally separates the UBFU from the LBFU and extends laterally throughout the basin. Near the basin margins, this unit is not distinguishable from the overlying and underlying units in many areas. This unit has been reported to produce groundwater in the Eloy Basin (ADWR, 1992) and has been mapped throughout the Florence Copper property. The MFGU has been divided into two sub-units, based on lithologic character (Hardt and Chattanay, 1965). The uppermost sub-unit consists of approximately 90 percent clay with intermittent sand and gravel lenses. The lower sub-unit is thicker, and extends into the deeper portions of the Eloy basin where it is approximately 3,000 feet thick. The lower sub-unit is primarily an evaporate unit composed of anhydrite with minor clay and silt. Although the MFGU has been recognized beneath the Site, it is approximately 30 to 40 feet thick and pinches out laterally within a distance of 2,000 feet to the west of the mine block test wells.

The LBFU is the lowermost alluvial unit in the Eloy Basin and is composed of semi-consolidated to consolidated coarse sediments including granitic boulders, cobbles, gravels and sands. Wells completed in the LBFU have produced yields ranging from 1,000 to 2,500 gpm (Montgomery, 1994). At locations where the LBFU lies under the MFGU, groundwater within the unit is confined or semi-confined. Where the LBFU lies directly beneath the UBFU, groundwater exists in unconfined conditions. The LBFU is the principal source of groundwater beneath the Site. The groundwater elevations and testing data generated from the wells in the mine block area at the Site (Section 4.6) indicate that the presence of the MFGU does not exert significant control on the circulation of water between the UBFU and the LBFU. The hydrologic characteristics measured at the Site reflect conditions that are comparable to a relatively unconfined aquifer, with significant connection into the bedrock intervals where mine block wells are constructed. The hydraulically interconnected nature of the alluvial and bedrock units was discussed in detail in the APP Application (Brown and Caldwell, 1996a).

Bedrock beneath the LBFU at the Site is composed of Precambrian granite including the Oracle Granite, gneiss and schist. Bedrock beneath the Florence project area is generally assumed to be an impermeable boundary which underlies and borders the Eloy sub-basin (Wickham and Corkhill, 1989). However, localized fractures and faults in the bedrock can allow water to penetrate and move through the rocks both vertically and laterally. The wells constructed for the in-situ mining test at the Site intersected faulted/fractured portions of the bedrock containing the oxide ore body and generally sustained pumping rates over 100 gpm.

3.5.2 Wells Located Within ½-Mile Radius of Site

Table 1 lists the locations, construction data, and well uses for all known wells located on and within ½-mile radius of the Site. The wells located within the Site boundary (pollutant management area) include test wells used for the hydraulic control test, core holes used to define the ore body, and various existing irrigation and domestic wells. Data provided on Table 1 was obtained from the Florence Copper project file information and ADWR's Groundwater Site Inventory and Well Registry databases.

A total of 20 wells (four injection, nine recovery, and seven observation) were installed for the utilization in the hydraulic control test. The injection and recovery wells were constructed in accordance with the well designs approved by ADEQ and EPA for operation of the mine. The casing diameter of these wells ranges between 4 and 6.5 inches. The injection/recovery wells are constructed at depths ranging from 225 to 894 bgs and the screened intervals are entirely within the oxide zone of the bedrock. Upon completion of the hydraulic control test, the injection wells were converted to pumping wells to maintain hydraulic control and rinse the leach zone.

A total of 31 POC wells were installed in 1995 and 1996 around the perimeter of the Site in accordance with conditions of the APP to demonstrate compliance with Aquifer Water Quality Standards (AWQS). In accordance with Part II.E.2 of the APP, 12 monthly samples were collected from each POC well in order to establish the baseline (ambient) conditions for the calculations of Alert Levels and Aquifer Quality Limits. The POC wells are constructed at total depths ranging from 170 to 1,259 feet bgs to monitor the three distinct water intervals in the UBFU, LBFU, and bedrock oxide zone. Twelve of the POC wells are constructed with screened intervals in the bedrock oxide zone, another 12 are screened across the LBFU, and seven are screened across the UBFU (see Table 1).

In addition to the POC wells, there are 59 wells located outside of the Site that were installed during a period from 1972 through 1995, primarily for aquifer testing purposes. These wells were installed in pairs of one testing well and another observation well, generally denoted with the prefix P (testing) or O (observation); see Table 1. These wells were installed at various depths ranging from 270 to 1,578 feet bgs. The majority of the wells were screened across the bedrock oxide zone, but multiple wells also were constructed with screen across the UBFU and LBFU.

Other wells located on or within a ½-mile radius of the Site, and listed on Table 1, include wells used for irrigation, domestic, industrial, recharge, monitoring, and testing purposes. The wells were installed between 1934 and 1977, according to ADWR records. The well depths range from 259 to 2,006 feet bgs, but the aquifer zones screened are difficult to determine due to the incomplete nature of the well records. Some of the wells have recorded upper screen depths as shallow as 62 feet bgs.

3.5.3 Groundwater Elevation and Flow Direction

Water levels have been measured from a variety of wells on the Site since the mid-1990s, with a reduced number of wells monitored for the APP after the hydraulic control test was completed in 1998. Appendix D provides a table of all recorded water levels measured from various test, observation, and POC wells. In general, the water level data from the POC wells indicate a gradual decline of approximately 50 feet from 1996 to 2004. From 2004 to 2006, water levels have been relatively consistent. Hydrographs depicting water levels representative of wells in constructed in the UBFU, LBFU, and bedrock oxide hydrogeologic units are presented in Appendix D. Water level monitoring of the mine block test wells also shows a gradual decline in water level elevations from 1998 to 2002. Water level data collected from eight of the mine block test wells from 2002 through mid-2006 indicates that the water levels have fluctuated in response to seasonal precipitation, but have not continued to cumulatively decline.

The groundwater elevation data provided in Appendix D indicate that the groundwater elevations in wells constructed across the various hydrogeologic units are currently, and historically have been relatively consistent. The consistency of groundwater elevations regardless of the zone(s) that the wells are screened in indicates a greater level of hydraulic connection between the aquifer zones than cited in referenced sources. Aquifer testing summarized in the APP Application noted vertical gradients between the UBFU, LBFU, and bedrock at the Site (Brown and Caldwell, 1996a).

The groundwater elevations in the mine block test wells has been within a range of approximately 195 to 214 bgs (equivalent elevations of 1,240 to 1,270 feet amsl) since 2002. Figure 3 depicts groundwater elevations in the mine block test wells as of July 2006. The water table, based on July 2006 water level measurements (and shown on Figure 3), is within the UBFU. The hydraulic control testing and monitoring data indicated that the prolonged pumping of the mine block wells influenced the groundwater elevations and flow measured in the UBFU. The groundwater elevation data obtained from various wells across the Site support the characterization of a relatively unconfined aquifer with minimal influence of the MFGU between the UBFU and LBFU.

The static groundwater flow direction across the Site is to the west-northwest. This general flow direction is a result of prolonged pumping from wells located north of the Gila River, which have modified the original south-directed groundwater flow pattern. In 1995, the groundwater flow direction was determined to be toward to the northwest with an overall gradient of approximately 33 feet per mile. The flow for the UBFU, LBFU, and bedrock aquifers indicated a similar pattern to the west or northwest, with perturbations attributed to pumping by productions wells. A groundwater divide was present along the general trend of the Gila River approximately one mile south of the Site.

Evaluations of the hydraulic control effects of the mine test wells were presented in the *Closure and Post-Closure Plans* (Brown and Caldwell, 2001b). The groundwater flow pattern for the period of October and November 2001 depicted in that report indicated a significant alteration of flow due to the hydraulic control pumping at the Site. The overall flow at the Site was directed toward the northwest with a localized depression centered around the mine block test wells. The gradient was shallower in comparison to 1995 in many areas at approximately 20 feet per mile. Localized pumping at the Site caused a depression in the flow pattern that extended over 1,000 feet to the west, north, and east with a gradient of 0.02 feet per foot (264 feet per mile) within the area of the mine block. The groundwater divide was not present along the Gila River and the gradient indicated flow from the south beneath the river that continued north-northwest through the Site.

A comprehensive measurement of groundwater elevations across the Site has not been conducted since the 2001 event. However, groundwater elevation data has been collected from POC and mine block test wells on a quarterly basis for APP monitoring. The calculated gradient across the mine block test wells using compliance monitoring data from July 2006 is approximately 0.007 feet per foot (37 feet per mile) toward the northwest (Figure 3). The groundwater flow direction across the Site in the regional aquifer is, in general, to the west-southwest (Figure 4).

3.5.4 Aquifer Conditions

Aquifer parameters cited in published data and derived from test data generated specifically from the Site were discussed in the APP Application. Additional data was also generated during the hydraulic control test and subsequent monitoring. The UBFU has been shown to have hydraulic conductivity values ranging from 20 to 250 feet per day and specific yields ranging from 8 to 22 percent (Wickham and Corkhill, 1989). The potential yield to wells in the Eloy sub-basin is estimated at up to 3,000 gpm, although yields of 1,500 to 5,500 gpm have been reported in portions of the East Salt River Valley to the west of the Site (Corkhill and others, 1993).

The MFGU in the Eloy sub-basin can be locally productive if the well penetrates a sand and gravel lense; however, productivity of the MFGU is generally limited. The hydraulic conductivity of the MFGU has been estimated to range from 5 to 50 feet per day, with specific yields estimated to range from 3 to 14 percent (Corkhill and others, 1993). However, test data specifically generated for the Site indicated substantially lower hydraulic conductivity of approximately 1.4 to 5 feet per day (Brown and Caldwell, 1996a). Although the MFGU is considered to act as an aquitard between the UBFU and LBFU, hydraulic testing summarized in Section 4.5.2 indicated pumping in the bedrock could influence water levels in the LBFU and UBFU at the Site.

The LBFU in the Eloy sub-basin is unconfined where the MFGU is not present and well yields in the LBFU are similar to those observed in the UBFU (Wickham and Corkhill, 1989). The data collected from the wells at the Site indicate that there is a significant hydraulic connection between the UBFU and the LBFU despite the presence of the MFGU in some areas, including the mine test block. The hydraulic conductivity of the LBFU ranges from 5 to 60 feet per day and the specific yield ranges from 3 to 15 percent (Corkhill and others, 1993). Hydraulic conductivity values of 0.02 to 25.5 feet per day were generated by testing specifically for the Site (Brown and Caldwell, 1996a).

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The bedrock in the vicinity of the Site is generally considered impermeable except at locations that have been extensively fractured or faulted (Wickham and Corkhill, 1989). The hydraulic conductivity values that were cited for the bedrock from published and unpublished data in the APP Application ranged from 0.23 to 8.93 feet per day (Brown and Caldwell, 1996a). Data generated from aquifer testing of the oxide and sulfide bedrock zones prior to submittal of the APP Application yielded hydraulic conductivity values from 0.0055 to 3.8 feet per day. These values are significantly reduced in comparison to the conductivities in the UBFU and LBFU. The hydraulic control testing described in Section 2.2.1 used wells screened at or above the bedrock oxide zone and achieved sustained pumping rates that exceeded 100 gpm. Although there is an inferred hydraulic connection to the UBFU and LBFU, the conditions of the fracture flow in the bedrock significantly reduce the potential pumping rates in comparison to the alluvial units.

3.5.5 Surface Water

The Site is located in the Gila River watershed, which drains an area of approximately 58,000 square miles, beginning in the Elk Mountains in southwestern New Mexico to its confluence with the Colorado River at Yuma, Arizona. The Gila River is located approximately one mile from the southern edge of the Site. The specific portion of the Gila River adjacent to the Site is referred to as the Middle Gila River (Huckleberry, 1993) and has been designated as aquatic and wildlife, effluent-dependent water pursuant to Appendix B of A.A.C. Title 18, Chapter 11, Article 1. This section is downstream from the town of Florence wastewater treatment plant discharge point.

The surface water flow across the Site is generally toward the south and eventually discharges into the Middle Gila River. The surface water drainages at the Site and the Middle Gila River are considered ephemeral; however, water has been present for prolonged periods along the Gila as a result of significant flood events or release of water from dams upstream. Surface water at the Site originates from direct accumulation of precipitation and runoff. No natural surface water catchments exist at the Site. The evaporation lagoon constructed for hydraulic control testing is located southeast of the mine block test wells (Figure 2). This structure has been monitored as part of the APP and observations have documented water accumulated from precipitation on multiple dates.

Multiple canals have been constructed that either intersect the Site, or are located in a relatively close proximity. The North Side Canal (North Canal) conveys water from the Middle Gila River westward across the central portion of the Site, approximately 1,000 feet northwest of the mine block test wells (Figure 2). Additional smaller canals are located within the Florence Copper property, but are not within the boundaries of the in-situ mine test Site. The Central Arizona Canal is located approximately two miles northeast of the Site and conveys water from the Colorado River to the areas around Florence. Additional canals are located south of the Middle Gila River, but are not in close proximity to the Site.

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The surface drainages across the Site have been divided into two watersheds designated as the West Drainage Watershed (two drainages) and the East Drainage Watershed (single drainage) in the APP Application (Brown and Caldwell, 1996a). The East Drainage Watershed channel crosses beneath the Hunt Highway near the location of the proposed support facilities and west of the APP-exempt facilities (Figure 2). The drainage is controlled by man-made berms that direct flow toward the southeast and east away from the Site. The drainage channels of the Western Drainage Watershed enter the Site from the north-northwest. Surface water is directed beneath the railroad embankments and Hunt Highway in culverts and follows the two channels to the North Canal (Figure 2). Estimates of flow capacity in both the Western and Eastern Drainage Watersheds indicate that significant water retention or ponding could occur during 100-year flood events north of the railroad embankments and Hunt Highway (Brown and Caldwell, 1996a). The peak flow in the drainages across the Site would therefore be limited due to the potential retention of water. The North Canal could also act as an impediment to flow if a major flood event occurred, but portions of water would also be diverted along the canal and those effects have not been estimated to date.

4.0 SITE INVESTIGATION SUMMARY

The investigations that have been conducted at the Site have been limited due to the restricted level of activities other than the hydraulic control test summarized in Section 2.2.1. Investigations consisted of general inspections, sediment sampling, and water monitoring to verify hydraulic control and compliance with the APP requirements. The details and results of those investigations are presented in this section.

4.1 1996 FOCUSED FACILITY INVESTIGATION

In 1996, Brown and Caldwell conducted a Focused Facility Investigation of the Florence In-situ Copper Project area. The report was prepared for the exclusive use of Magma Copper Company for the purpose of assisting in evaluating potential environmental impairments associated with the former Conoco facilities at the Site (Brown and Caldwell, 1996). The report was not a Phase I Site Assessment, although some aspects did follow the American Society for Testing and Materials (ASTM) Phase I standards.

The Focused Facility Investigation consisted of the following five tasks:

1. Records Review – records were obtained and reviewed to identify *recognized environmental conditions* in connection with the Site;
2. Site Reconnaissance – site visits were conducted to obtain information regarding the likelihood of identifying *recognized environmental conditions* in connection with the Site;
3. Interviews – interviews were conducted with individuals familiar with the property for the purpose of obtaining information regarding *recognized environmental conditions*;
4. Limited Soil Sampling – limited soil sampling was conducted based on the results of the records review, site visits, and interviews; and
5. Evaluation and Report Preparation – a report was prepared that listed the findings of the above-listed tasks.

At the request of Brown and Caldwell, Environmental Data Resources, Inc. (EDR) conducted a review of state and federal records for information relating to the Site and surround properties. Databases searched included National Priorities List (NPL); Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); Resource Conservation and Recovery Information System (RCRIS); Emergency Response Notification System (ERNS); ADEQ's Underground Storage Tank (UST) Program, Leaking UST Program, Hazardous Waste Sites List, Solid Waste Facility List, Drywell Registration List, Water Quality Assurance Revolving Fund list; EPA's Toxic Substances Control Act (TSCA) list of regulated facilities; and ADEQ's Emergency Response Unit's Arizona spills database.

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The Focused Facility Investigation found no listings of sites within at least a 0.50-mile radius of the Site on the NPL, CERCLIS, RCRIS, or TSCA lists; no listings in the UST or Leaking UST database; no drywells registered on the Site; no listing of facilities deemed hazardous on the Site; and no emergency response notifications identified for the Site.

Minor soil staining was noted on one of the concrete transformer pads suggesting that transformer oils may have been released; soil staining was also noted near a 550-gallon diesel fuel above-ground storage tank. Soil sampling was conducted by Brown and Caldwell on October 26, 1995 in these areas as well as near the SX area, vat leaching area, storage tanks, tailing ponds, and other areas where discharges or spills may have occurred. The various soil sampling analyses indicated either no detectable concentrations of total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs) and/or metals, or no concentrations above background levels at 5 feet bgs. Based on field observations and analytical data, it was recommended that no further investigation or remediation activities be conducted at the Conoco site.

4.2 JUNE 2001 SITE INSPECTION

On June 4, 2001, Brown and Caldwell conducted an inspection of the in-situ well field, pipeline, and evaporation pond for the purpose of documenting the condition of the visible portions of the wells, pipelines, tanks, and evaporation pond used in the hydraulic control test. Brown and Caldwell subsequently prepared a report summarizing the findings (Brown and Caldwell, 2001a).

The well field is surrounded by a soil berm approximately 1 foot higher than the ground surface; each individual wellhead has an approximately 3-foot square lined (heavy plastic) containment area. Historical documents indicated leaks inside the wellhead containment area appeared to be minimal, if any. There was no recent evidence, and no historical documentation, of overtopping in any of the containment areas. Leakage from valves and fittings of pipes located within the well field area has been observed and documented, but the leakages were outside of the individual wellhead containment areas. Evidence of past leakage was in the form of minimal buildup around valves or pipe fittings and by stained and/or wet soil. Areas with wet, damp, or stained soils were not sampled for analysis. Leaking water was documented at the northeast corner of Well BHP-9. This leak was measured at a rate of approximately one drop every four seconds. No leakage has been observed or reported from piping associated with wells BHP-5, BHP-7, BHP-10, and BHP-13.

4.3 SEPTEMBER 2006 SITE INSPECTION

On September 20, 2006, Brown and Caldwell conducted an inspection of the existing conditions of the Site in preparation for this document. The September 2006 site inspection included visual observations of the APP-permitted facilities as listed in Section 2.4, as well as the exempt facilities (administration complex, tanks, and pipelines). Each facility was observed for evidence of damage, repairs, leaks, or spills and evaluated for potential environmental concerns for closure. Photographs of the site taken during the September 2006 site visit are included in Appendix B of this Site Investigation Plan.

The evaporation pond was observed from the fence line surrounding the pond. Figure 5 shows the condition of the evaporation pond as it was during the September 2006 site visit. A small quantity of water was observed in the pond, likely due to recent rains in the area. A thin layer of sediment was observed on the bottom of the pond (Figure 5). No obvious damage to the pond lining was observed; however, close inspection was not possible during this site visit.

The tank storage area adjacent to the pond included tanks used for storage of PLS, sulfuric acid, raffinate, sodium hydroxide, and water. Each tank was situated on a concrete pad with a plastic lining. Various pipelines were observed leading from the tank farm to the well field west of the tanks. According to Mr. Pete Kelm (Site Manager, Florence Copper), the tanks have been empty and unused for a number of years. No evidence of leakage, spillage, or damage to the tanks, pipelines, or connections was observed during the September 2006 site inspection. The pipeline leading from the tank farm to the well field was visually observed and there were no indications of leakage, spillage or damage to the pipeline. The test well field was inspected and no evidence of leakage or damage was observed.

4.4 RECORDS REVIEW

As part of the preparation and compilation of data for this Site Investigation Plan, Brown and Caldwell conducted a review of the periodic monitoring and inspections documents completed by Florence Copper. Records were reviewed for evidence of past spills, releases, repairs, or damage that may have been identified during the periodic inspections of the APP-permitted portions of the Site. The documents reviewed included inspections for compliance with APP requirements as well as storm water compliance. Of particular importance were any documents indicating the condition of the pond lining and tank inspections.

No evidence was found during the records review that documented or would indicate a potential release at the Site. However, the records review did identify a train derailment that occurred in the early 2000s on an area located outside of the Site boundaries, on the adjoining property to the north across Hunt Highway. The incident involved a tank car containing sulfuric acid that released sulfuric acid down a dry wash; the spill of sulfuric acid encroached onto the north boundary of the Site. The Copper Basin Railway subsequently performed a remedial action in accordance with regulatory requirements at that time. A request was made by BHP to Copper Basin Railway for the railway company to conduct further clean up of the spill on land owned by BHP (subsequently Florence Copper). Although Mr. Kelm (Florence Copper) was aware of the train derailment incident, additional documentation of the results of the remediation was not found in the Site records.

4.5 GROUNDWATER MONITORING

Groundwater investigations have been conducted at the Site in accordance with the APP and UIC permits in three phases: ambient groundwater monitoring of the POC wells, groundwater quality sampling of the mine block test field after hydraulic control testing was complete, and compliance groundwater monitoring of the POC wells during and after the hydraulic control testing. The following sections summarize the results for those monitoring phases. Appendix B provides summary tables of each POC well and all associated analytical results, from both ambient monitoring and compliance monitoring.

4.5.1 Ambient Groundwater Monitoring of the POC Wells

As a requirement of the APP, BHP collected 12 consecutive months of groundwater quality samples from each of the 31 POC wells prior to the testing of the in-situ mine. The objective of the ambient groundwater quality monitoring was to establish the baseline conditions for the calculations of Alert Levels and Aquifer Quality Limits in the APP. Ambient monitoring for the first set of POC wells began in June 1995. Subsequent POC wells began their ambient monitoring soon after installation and completion. The last set of POC wells to be installed ended their ambient monitoring in April 1997.

For each monthly ambient groundwater monitoring event, groundwater levels were measured in each of the POC wells and samples were collected for analyses of the following constituents:

- pH
- Sulfate
- Total dissolved solids (TDS)
- Calcium
- Potassium
- Sodium
- Magnesium
- Total Alkalinity
- Alkalinity (Carbonate, Bicarbonate, Hydroxide)
- Chloride
- Fluoride
- Nitrate
- Ion balance
- Metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, and zinc)
- Benzene, ethylbenzene, toluene, total xylene (BTEX)
- Total petroleum hydrocarbons- diesel range (hydrocarbons C₁₀ – C₂₂; [TPH-D])
- Radiochemicals (Gross alpha, adjusted gross alpha, radium 226 + 228, uranium)

The ambient groundwater monitoring results for all of the POC wells were used to calculate Alert Levels and Aquifer Quality Limits, which were inserted into Tables III.B and C of the APP.

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VOCs were analyzed in the POC wells during the first two months of ambient monitoring. No VOCs were detected above their respective laboratory detection limits; therefore, VOCs were eliminated for the remaining ambient monitoring period. During the 12 months of ambient groundwater monitoring, many of the wells had at least one occurrence of gross alpha particle activity above 15 picoCuries per liter (pCi/L). However, the adjusted gross alpha AWQS of 15 pCi/L requires that uranium and radon concentrations be subtracted from the laboratory result prior to comparison to the standard. The laboratory that analyzed the Florence Copper water samples back in 1995 and 1996 did not calculate an "adjusted" gross alpha value.

In general, the ambient groundwater quality data indicated good quality water in all three zones of the aquifer. There were occasional AWQS exceedances for cadmium, thallium, and antimony, and gross alpha particle activity and total radium. There were no AWQS exceedances for any other constituents of concern (COCs). Appendix B contains summary tables for all of the ambient groundwater monitoring (and compliance monitoring) data for all of the POC wells. The following sections summarize the general water quality and AWQS exceedances detected during the ambient groundwater monitoring period.

4.5.1.1 Ambient Water Quality in the UBFU Zone

Water quality in the UBFU is characterized by a pH (field) ranging from 6.8 to 7.6 S.U, specific conductance (field) ranging from 1,200 to 2,600 μ S/cm, TDS concentrations ranging from 680 to 1,800 mg/L, and sulfate ranging from 150 to 400 mg/L. Nitrate concentrations range from 6.1 to 17 mg/L. The table below summarizes and lists the AWQS exceedances for the wells screened in the UBFU zone.

**TABLE 4-1. AWQS EXCEEDANCES FOR WELLS SCREENED
 IN THE UBFU ZONE**

POC WELL	PARAMETER	DATE OF EXCEEDANCE	RESULT	AWQS	UNITS
M21-UBF	Antimony	5-1996	0.0064	0.006	mg/L
	Thallium	12-1996	0.0094	0.002	mg/L
	Total Radium	8 -1996	83.7	5	pCi/L
M23-UBF	Cadmium	7-1996	0.02	0.005	mg/L
	Thallium	10-1996	0.0065	0.002	mg/L
	Thallium	12-1996	0.0084	0.002	mg/L
M29-UBF	Thallium	12-1996	0.0086	0.002	mg/L
M33-UBF	Cadmium	2-1997	0.009	0.005	mg/L

4.5.1.2 Ambient Water Quality in the LBFU

Water quality in the LBFU is characterized by a pH (field) ranging from 6.9 to 8.1 S.U, specific conductance (field) ranging from 738 to 2,300 $\mu\text{S}/\text{cm}$, TDS concentrations ranging from 530 to 1,500 mg/L, and sulfate ranging from 31 to 260 mg/L. Nitrate concentrations range from 2.0 to 9.7 mg/L. The table below summarizes and lists the AWQS exceedances for the wells screened in the LBFU zone.

TABLE 4-2. AWQS EXCEEDANCES FOR WELLS SCREENED IN THE LBFU ZONE

POC WELL	PARAMETER	DATE OF EXCEEDANCE	RESULT	AWQS	UNITS
M1-GL	Cadmium	7-1996	0.019	0.005	mg/L
M2-GL	Antimony	11-1995	0.0071	0.006	mg/L
	Cadmium	8-1995	0.0079	0.005	mg/L
M14-GL	Cadmium	7-1996	0.015	0.005	mg/L
	Total Radium	7-1995	36.9	5	pCi/L
M15-GU	Cadmium	1-1996	0.0091	0.005	mg/L
	Cadmium	7-1996	0.018	0.005	mg/L
M18-GU	Cadmium	7-1996	0.018	0.005	mg/L
O49-GL	Cadmium	7-1996	0.018	0.005	mg/L

4.5.1.3 Ambient Water Quality in the Bedrock Oxide Zone

Water quality in the bedrock oxide zone is characterized by a pH (field) ranging from 7.0 to 9.7 Standard Units (S.U.), specific conductance (field) ranging from 470 to 862 microSiemens per centimeter ($\mu\text{S}/\text{cm}$), TDS concentrations ranging from 200 to 519 milligrams per liter (mg/L), and sulfate ranging from 6 to 130 mg/L. Nitrate concentrations are all below 1.3 mg/L; the AWQS for nitrate is 10 mg/L. The table below summarizes and lists the AWQS exceedances for the POC wells screened in the oxide zone. As the dates indicate, all exceedances occurred prior to the hydraulic control test.

TABLE 4-3. AWQS EXCEEDANCES FOR POC WELLS SCREENED IN THE OXIDE ZONE

POC WELL	PARAMETER	DATE OF EXCEEDANCE	RESULT	AWQS	UNITS
M22-O	Antimony	6-1996	0.0065	0.004	mg/L
	Cadmium	7-1996	0.018	0.005	mg/L
	Cadmium	2-1997	0.0077	0.005	mg/L
	Thallium	10-1996	0.0069	0.002	mg/L
	Thallium	12-1996	0.0057	0.002	mg/L
	Gross alpha	8-1996	27	15 *	pCi/L
	Gross alpha	10-1996	22	15 *	pCi/L
P49-O	Cadmium	7-1996	0.016	0.005	mg/L
M4-O	Cadmium	8-1995	0.0071	0.005	mg/L
M30-O	Thallium	10-1996	0.006	0.002	mg/L
	Thallium	1-1997	0.0087	0.002	mg/L

*Note: the AWQS is for adjusted gross alpha which specifically includes radium 226 but excludes uranium and radon concentrations. The concentrations of gross alpha listed in this table include radium, uranium, and radon.

4.5.2 Post-Hydraulic Control Test Monitoring

Upon completion of the hydraulic control test in February 1998, groundwater sampling was conducted on the mine block test wells, which consisted of the injection and recovery wells (BHP-1 through BHP-13), two multi-screen chemical wells (CH1 and CH2), and five observation wells located outside of the leach zone (OWB-1 through OWB-5). The mine block test wells were sampled four separate times after the hydraulic control test. The first sampling event occurred in the fall of 2000 (September 20/21 and October 19, 2000); the second sampling event was conducted in the summer of 2001 (June 4/5 and July 21, 2001); the third sampling event was conducted in winter of 2003 (December 29/30, 2003, and January 5/12, 2004); and the fourth sampling event was conducted in the winter of 2004 (December 6, 7, and 21, 2004). In addition, two chemical wells (CH1 and CH2) were re-sampled in May 2005 for radiochemicals.

Groundwater samples collected from the mine block test wells were analyzed for all parameters listed in Part IV, Tables III.B (Level I) and C (Level II) of the APP. Table III.B, Quarterly Compliance Monitoring, includes the following parameters: pH (field), specific conductance (field), temperature (field), fluoride, magnesium, sulfate, and TDS. Table III.C of the APP includes pH, specific conductance, TDS, major ions, trace metals, VOCs (BTEX, TPH-D) and radiochemicals. Radium 226 and radium 228 were required to be analyzed only in the event that a sample that reported gross alpha concentration greater than 5 pCi/L; total uranium was only analyzed in samples with a gross alpha concentration greater than 15 pCi/L. During the winter 2004 sampling event, the mine block test wells were analyzed only for sulfate. Two wells (BHP-4 and OWB-3) were analyzed for a full suite of analytes. During the May 2005 re-sampling event, the two chemical wells (CH1 and CH2) were re-sampled for radiochemicals only.

Summary tables of the laboratory analyses from the mine block test wells, including field parameter measurements, are included in Appendix A. The only concern regarding the mine block test wells is that the four injection and recovery wells (BHP-6, BHP-7, BHP-8, and BHP-9) and three of the observation wells (CH2-G, CH2-R, and CH2-B) showed pH values ranging between 3.78 and 5.14 in the September 2000, June 2001, and December 2003 data. The nine recovery wells (BHP-1, BHP-2, BHP-3, BHP-4, BHP-5, BHP-10, BHP-11, BHP-12, and BHP-13) have had pH values ranging from 5.81 to 7.74 in the same data sets. The remaining eight observation wells have had pH values ranging from 6.08 to 7.7. The pH values in laboratory analyses were generally comparable to those measured in the field, indicating that the injection wells and selected recovery wells contained water with pH below 6.5. The pH values increased between 2000 to 2004 as a result of the continuous flushing of water from the formation through the original injection wells.

There is no numeric AWQS for pH, however, there is a federal secondary Maximum Contaminant Level (SMCL) for pH. SMCLs are non-enforceable guidelines used to evaluate contaminants that may cause aesthetic effects, such as odor, taste, or color in drinking water. The SMCLs were used to compare the post-hydraulic control testing water quality parameters with pre-testing conditions and to evaluate the attenuation of those parameters that did not have established numeric AWQSSs.

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The post-hydraulic control test monitoring showed one exceedance of the AWQS for beryllium (in well BHP-9) and six exceedances of the AWQS for nickel in the September 2000 sampling event. Other than those exceedances, all other metals from the mine block test wells have been below the AWQSs. Concentrations of both nickel and beryllium decreased to below the AWQSs in the 2003 samples (see Appendix A).

Fluoride and nitrate concentrations in all of the mine block test wells have been below the AWQSs (4.0 mg/L and 10 mg/L, respectively). Chloride concentrations in the mine block test wells were below the SMCL (250 mg/L). TDS concentrations ranged from 420 to 1,310 mg/L (the SMCL for TDS is 500 mg/L); sulfate ranged from 48 to 670 mg/L (the SMCL for sulfate is 250 mg/L).

Analyses for organic constituents did not detect BTEX or diesel-range constituents in any of the samples analyzed in 2000, 2001, or 2003 (Appendix A).

Radiochemical analyses conducted in June 2001 indicated elevated concentrations of adjusted gross alpha above the AWQS of 15 pCi/L in 7 of the 20 wells sampled, and total radium above the AWQS of 5 pCi/L in 6 of the 20 wells sampled. During the 2003 event, many of the radiochemical concentrations were lower. However, concentrations of adjusted gross alpha and total radium in samples from wells BHP-2, BHP-12, CH-1, CH-2, and OWB-4 collected in 2003 remained above their respective AWQSs (Appendix A). A discussion of the detected radiochemical elements in the *Proposed Cessation of Hydraulic Control at the Florence Project In-Situ Test Field, Florence Copper* (Brown and Caldwell, 2004) asserted that the elevated concentrations were attributed to the mineralogy of the bedrock and ore body, based upon laboratory analyses of mineral samples. The low sulfate concentrations in wells OWB-4 and BHP-2 indicated that the leaching process had affected a large area suggesting that the adjusted gross alpha values reflected conditions of the surrounding bedrock.

A summary of the post-hydraulic control test monitoring and detailed discussion of the results was presented in the *Proposed Cessation of Hydraulic Control at the Florence Project In-Situ Test Field, Florence Copper* (Brown and Caldwell, 2004) and submitted to ADEQ in April 2004. Florence Copper subsequently requested permission from ADEQ and EPA to discontinue hydraulic control in order that additional tests be conducted in accordance with Part II.H.2 of the APP and Part II.I.2 of the UIC permit.

On August 24 and 25, 2004, ADEQ and EPA authorized Florence Copper to discontinue hydraulic control so that the testing could be completed. Pumping was discontinued on September 1, 2004 and groundwater samples were collected in December of 2004 to evaluate water quality after the 90-day equilibration period had elapsed.

Florence Copper submitted a report (Brown and Caldwell, 2005) to ADEQ and EPA that detailed the results of the final post-hydraulic control sampling event and requested approval to permanently discontinue hydraulic control. ADEQ and EPA subsequently requested additional radiochemical testing on four of the observation wells (CH1-R, CH1-B, CH2-R, and CH2-B) due

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to high gross alpha, radium, and uranium concentrations. The previous concentrations in the CH wells were considered to be biased due to the well design which did not allow for complete purging prior to sampling. Verification sampling was performed for the four wells on May 19, 2005, during which the wells were purged three days in succession prior to sampling. The results were summarized and submitted to both agencies in a letter dated June 17, 2005. In a letter dated July 18, 2005, Mr. David Albright, Manager of Ground Water Office, EPA Region IX, stated that Merrill Mining "may cease its rinsing operations and proceed with the closure of the wells in the in-situ test fields in accordance with the Well and Corehole Abandonment Plan (Appendix C of the UIC permit)" (EPA, 2005). The pumping wells have not operated since.

4.5.3 Compliance Monitoring for POC Wells

Quarterly and biennial compliance monitoring of the 31 POC wells have been conducted in accordance with Part IV Tables III.A through C in the APP since completion of ambient groundwater monitoring in 1997. Biennial sampling, in accordance with Table III.C has occurred in 1999, 2001, 2003, and 2005. The most recent biennial sampling event was conducted in the Third Quarter 2005.

Monitoring of the 31 POC wells includes the collection of field measurements (pH, specific conductance, temperature) and collection of samples according to the frequency designated in Tables III.B (Level I) and C (Level II) of the APP. Level I parameters are required to be sampled quarterly; Level II parameters are required to be sampled biennially and on a contingency basis.

The results of the compliance monitoring have been provided to ADEQ and EPA in quarterly monitoring reports in accordance with the conditions of the APP and UIC permits. Each quarterly report summarizes the field activities, measurements, and analytical results for the POC well sampling. The reports also include comparisons of the analytical results to the permit Alert Levels and Aquifer Quality Limits, and discuss any verification sampling that may have been necessary as a result of the analytical results. Self Monitoring Report Forms (SMRFs) are also included with each quarterly monitoring report. In addition, annual groundwater withdrawal and use reports have been submitted to the ADWR as per Part II.L(6)(e) of the APP.

In summary, the results of the nine years of compliance monitoring at the 31 POC wells show that there have been no mine-related impacts to the aquifer from the hydraulic control test. There have been no occurrences of metals concentrations above any AWQSs; in most cases, all metals concentrations for all POC wells are below the laboratory method detection limit. None of the exceedances listed in the tables above in Section 4.5.1 has occurred again since the completion of the ambient groundwater monitoring.

In addition, there have been no AWQS exceedances of BTEX, TPH-D, or cyanide in any of the POC wells, neither prior to or after the hydraulic control test. As stated above in Section 4.5.1, a full suite of VOCs was analyzed in the POC wells during the first two months of ambient monitoring, but since there were none detected above the laboratory detection limits, VOCs other than BTEX and TPH-D were eliminated for the remaining ambient monitoring period and for compliance monitoring.

As stated above in Section 4.5.1, gross alpha particle activity was detected in some of the POC wells during the ambient monitoring period at concentrations above the AWQS (15 pCi/L). However, since completion of the ambient monitoring period, none of the POC wells has shown a gross alpha concentration close to or above the AWQS. It was believed that the reason for the apparent decline in radiochemical concentrations was due to improved analytical methodologies. The APP requires that radium 226 and radium 228 be analyzed when gross alpha exceeds 5 pCi/L. Uranium is analyzed only in the event of a gross alpha Alert Level exceedance.

Nitrate (as nitrogen) is the only parameter that has been detected in the POC wells in concentrations above the AWQS (10 mg/L). Eight of the POC wells (M4-O, M16-GU, M21-UBF, M23-UBF, M25-UBF, M29-UBF, M32-UBF, and M33-UBF) typically have elevated nitrate concentrations (ranging from 10 to 20 mg/L). However, elevated concentrations of nitrate were observed in all of these same POC wells during the ambient monitoring period, so the nitrate is not attributable to the hydraulic control test. Nearly all of the wells with elevated concentrations of nitrate are screened in the uppermost portions of the aquifer (UBFU), suggesting the source of nitrates may be related to agricultural activities.

4.6 OPERATIONAL MONITORING

Tables II.B and II.C in the APP require periodic monitoring of the leak detection systems for the various permitted ponds (PLS, raffinate, and evaporation ponds.) However, as stated previously, only one evaporation pond has been constructed at the Facility. Table II.B lists the sampling points and Table II.C lists the specific monitoring requirements. Table II.C requires visual inspection of the leak detection sump on a weekly basis, and calculations of the volume and rate of fluids pumped on an "as pumped" basis. In addition, pond elevation is to be measured and recorded weekly, and pH and specific conductance are to be measured "as pumped". The required monitoring has been conducted on a daily basis by Florence Copper personnel and the records of monitoring are provided to Brown and Caldwell. The monitoring results are summarized and included with each quarterly compliance report submitted to the ADEQ APP Compliance Section and to EPA.

In summary, there have been no exceedances of the APP Action Leakage Rate Alert Levels since construction of the evaporation pond. An incident occurred, and was reported, in the First Quarter of 2003, when the pond liner was penetrated by a bird along one of the sides of the pond. Leakage was noted in the sump; however, the leakage ceased when the water level in the pond decreased below the hole by evaporation. The volume of water that leaked was minimal and no APP Alert or Action Levels were exceeded, as documented in the quarterly report submitted to ADEQ. (The bird was retrieved from the pond, treated, and later released.)

4.7 EVAPORATION POND SAMPLING

Although not required by the APP permit, Florence Copper collected water and sediment samples from the evaporation pond in prior years for characterization purposes. Water samples from the pond were collected in November 1999, June 2001, and December 2003; sediment samples were collected from the pond in November 1999 and December 2003. Summary tables showing the analytical results of pond water and sediment samples are included in Appendix E. Details of the pond sediment sampling were presented in the *Proposed Cessation of Hydraulic Control at the Florence Project In-Situ Test Field, Florence Copper* (Brown and Caldwell, 2004).

4.7.1 Evaporation Pond Water Analyses

As shown in the summary tables included in Appendix E of this Site Investigation Plan, the field pH values of the evaporation pond water ranged from 6.71 to 7.69 while the pH of the sediments was reported at 7.6. TDS concentrations in the pond water ranged from 4,660 to 8,700 mg/L; sulfate concentrations ranged from 3,000 to 10,000 mg/L. Metals detected in the evaporation pond water samples in concentrations above the AWQS consist of beryllium, nickel, and cadmium. Elevated concentrations of beryllium and nickel were also noted in a number of the mine block test well samples, however, cadmium was not. The laboratory detection limit for thallium was above the AWQS in 1999, however, subsequent samples indicate thallium concentrations in the pond water are below 0.001 mg/L. Although AWQS are used as a means of comparison for the pond samples, the pond water quality is not required to meet AWQSs.

The concentrations of alkalinity, nitrate, and silica in the evaporation pond water samples were comparable to those of groundwater samples in the mine block test wells. The concentrations of calcium, chloride, and potassium were significantly higher in the evaporation pond water samples compared to the groundwater results from the mine block test wells, probably a result of evaporation.

There were no detectable concentrations of BTEX and diesel-range hydrocarbons products in the evaporation pond samples. Radiochemical analyses were performed for a single evaporation pond water sample, which yielded results that were similar to those of groundwater samples from the mine block test wells. All of the radiochemical elements analyzed in the evaporation pond sample were below their respective AWQSs.

4.7.2 Evaporation Pond Sediment Analyses

Samples from the accumulated sediment in the evaporation pond were collected on two separate dates: November 1999 and January 2004. The sample collected in 1999 was analyzed for leachable concentrations of trace metals, using the synthetic precipitation leaching procedure (SPLP); the sample collected in 2004 was analyzed for total recoverable metals for all of the metals listed in Table III.C of the APP.

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Results for the 2004 total recoverable metals analyses indicated that concentrations of metals detected in the sediment sample did not exceed the Arizona residential Soil Remediation Levels (SRLs) or Groundwater Protection Levels (GPLs), which are used for comparison to the sediment samples. The pH value for the 2004 sediment sample was 7.59, which is effectively neutral and higher than the detected values in the water samples from the evaporation pond. Analytical results for the BTEX and diesel-range hydrocarbon analyses conducted on the sediment sample in 2004 were all below the laboratory detection limit and their respective SRLs and GPLs (Appendix E).

The SPLP results were compared with the respective AWQS only as a means of evaluation of the leachability data; there is no statutory requirement that the leachate from the sediment samples meet AWQs. The SPLP results indicated that leachable concentrations of antimony, arsenic, beryllium, cadmium, chromium, selenium, and thallium were below the laboratory detection limits, however, the laboratory detection limits for those seven metals were above their respective AWQS (Appendix E). Detected nickel concentrations in all of the SPLP samples were below the AWQS.

5.0 SITE INVESTIGATION EVALUATION AND SUMMARY

5.1 REGULATORY COMPLIANCE

The agencies requiring regulatory compliance for this Site are the ADEQ Aquifer Protection Program and the EPA UIC Program. The permits issued by both of these programs stipulate the practices and compliance levels for the required monitoring. The regulatory compliance standards for groundwater are the AWQSSs.

All monitoring and reporting, including submittal of SMRFs and UIC Monitoring Reports, has been conducted in accordance with the APP and UIC permits. No deficient or additional information is currently pending to ADEQ or EPA. The submittal of annual groundwater withdrawal and use reports has also been performed as required by the ADWR.

Quarterly and biennial groundwater monitoring of the 31 POC wells that surround the Site show no impacts to the aquifer as a result of activities conducted at this Site, and no recorded incidents or releases to the soil from the APP-permitted facilities have occurred.

5.2 APPROPRIATENESS OF DATA ACQUISITION

The collection of data at the Site has primarily been performed under the guidelines of the APP and UIC permits. The sampling methods, frequency, sample locations, and analyses have been conducted according to the APP/UIC permit stipulations or appropriate regulatory methods and documented in required reporting to ADEQ and EPA. Deviations from proposed data acquisition tasks have, on occasion, occurred due to physical limitations of sampling (e.g. dry wells), but they have been documented and supplied to ADEQ and EPA. Appropriate QA/QC reviews of laboratory data generated by activities summarized in Section 4.0 were performed and the analytical results were considered acceptable for use.

The comparison of monitoring and sampling parameters has been performed to the applicable regulatory compliance levels. The data acquired for the APP-regulated portions of the Site are hence, considered appropriate to evaluate the completeness of investigation activities.

5.3 DATA GAP ANALYSIS

Prior to preparation of this Site Investigation Plan, a review of existing data was conducted to determine if any significant gaps or issues existed and if so, whether additional investigation activities may be required prior to requesting Clean Closure of the Site.

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Only one minor data gap was identified and that was related to the tank car spill of sulfuric acid by the Copper Basin Railway in the early 2000s as discussed in Section 4.4 above. The remedial action for the spill was reportedly performed in accordance with regulatory guidelines; however, documentation pertaining to the clean up done on BHP property could not be found in the Site records. The surface release and remediation of sulfuric acid by the Copper Basin Railway occurred outside of the Site boundaries, but the precise location has not been identified. The age of the release and location at the surface do not suggest that significant environmental effects remain that would degrade soil quality or pose a concern for surface or groundwater. The acidic conditions that may have been present at or near the surface have probably attenuated due to dilution by precipitation and runoff. The acquisition of additional information regarding the remediation by the Copper Basin Railway is considered a non-critical data gap that can be addressed as part of the APP closure activities, if necessary.

No critical data gaps or issues were identified that would require additional sampling prior to closure of this Site.

5.4 CONSTITUENTS OF CONCERN

The designation of constituents of concern (COC) is typically used to identify chemicals that may require investigation or remedial action at a site. Because this Site is not under investigation for remedial action, no COCs have been defined for the Site; the discussion of COCs in this Section is solely intended to facilitate determinations regarding compliance to regulatory levels and the completeness of investigations at the Site. Specific chemicals and compounds initially included in the groundwater monitoring requirements for the Florence Copper In-Situ Mine Project include:

- Indicator parameters (pH, specific conductance, temperature);
- TDS;
- Metals;
- Major ions (calcium, magnesium, potassium, sodium, chloride, fluoride, sulfate);
- Nitrate;
- Alkalinity (total, carbonate, bicarbonate, hydroxide);
- VOCs;
- BTEX;
- TPH-D (hydrocarbons in C₁₀-C₂₂ range); and
- Radiochemical parameters.

Of the above-listed constituents, those that have been detected in concentrations above the numeric AWQS in the groundwater are limited to the following:

- Beryllium – one time, in one mine block test well (BHP-9, September 2000).

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- Cadmium – in 11 of the POC wells, during the ambient monitoring period; no exceedances (or detections) of cadmium since completion of ambient monitoring period.
- Nickel - in September 2000, six of the mine block test wells contained nickel in concentrations above the AWQS; no further exceedances of nickel.
- Adjusted gross alpha and total radium – detected in nine of the mine block test wells; most recent sampling event (December 2003) four of the mine block contained concentrations of gross alpha and total radium above the AWQS.
- Nitrate – in eight of the POC wells, during the ambient monitoring period; most likely attributable to agricultural activities.

Although there is no AWQS for pH in the groundwater, eight of the mine block test wells, as of the most recent sampling event (December 2003), have pH values less than 6.5 S.U., which is the minimum SMCL for pH. Value of pH in those eight wells has previously ranged from 3.96 to 6.46 S.U. However, the overall trend in those wells is that the pH is increasing since the cessation of the hydraulic control test in 1998. All of the mine block test wells are screened in the oxide-bedrock zone.

A discussion of the trend of pH values in the mine block test wells was presented in the *Proposed Cessation of Hydraulic Control at the Florence Project In-Situ Test Field* document (Brown and Caldwell, 2004). The natural movement of groundwater through bedrock unaffected by the hydraulic control test is expected to attenuate the pH such that the low pH water will not leave the test field. Based on the fact that the pH in the POC wells surrounding the Site is currently, and has historically been, within normal range and considering the distance from the mine block to any wells located outside of the Site boundaries, the potential to impact any wells outside the Site is highly improbable. In addition, any potential future usage of the groundwater would most likely occur in the upper alluvial units due to the fact that the alluvial sediments are capable of supplying significantly higher yields than the bedrock.

6.0 CONCLUSIONS

BHP applied for and was issued an APP for the Florence Copper In-Situ Mine in June 1997. In accordance with a requirement in the APP, BHP conducted a hydraulic control test at the Site between October 1997 and February 1998 utilizing 20 test wells in one mine block. The test consisted of injecting acidic solutions into the oxide-bedrock zone (ore body) then recovering and analyzing the solutions. This is the only time period in which in-situ mining was conducted.

Florence Copper purchased the property from BHP in early 2001. No mining or additional testing has occurred during Florence Copper's ownership.

Although numerous facilities were permitted to be constructed and operated at the Site, only one evaporation pond was constructed. It was used to contain solutions during the hydraulic control test. Thirty-one POC wells were constructed for the purpose of demonstrating compliance with AWQS. The POC wells were monitored, in accordance with requirements in the APP, for 12 consecutive months prior to the hydraulic control test to establish ambient groundwater conditions. Thereafter, the wells were monitored quarterly for a short list of constituents and biennially for a longer list of constituents.

The most recent quarterly sampling event for the POC wells was the Third Quarter 2006; the most recent biennial sampling event for the POC wells was the Third Quarter 2005. Based on the most recent quarterly and biennial sampling events, there were no AWQS exceedances for metals, VOCs, or radiochemicals in any of the POC wells. A number of the POC wells do have nitrate concentrations above the AWQS; however, elevated nitrate in those wells was also detected during the ambient groundwater monitoring period.

The most recent sampling event for the mine block test wells for all constituents was December 2003. There were no AWQS exceedances for any metals in any of the test wells. The only COC in the mine block test wells is pH: eight of the mine block test wells had pH values less than 6.5 S.U. in the December 2003 sampling event. However, pH in the POC wells surrounding the Site is currently, and has historically been, within normal range. Also, considering the distance from the mine block to any wells located outside of the Site boundaries, the potential to impact any wells outside the oxide-bedrock unit is highly improbable.

Sediment and water samples have been collected from the evaporation pond and analyzed for various constituents. Pond water samples were collected in November 1999, June 2001, and December 2003; sediment samples were collected in November 1999 and December 2003. The pond water samples were analyzed for indicator parameters, major ions, total metals, BTEX, diesel-range hydrocarbons and radiochemicals; only beryllium, nickel, and cadmium were detected at concentrations above the AWQSs. The sediment samples were analyzed for total recoverable metals and SPLP. All metals in the sediment samples were below the Arizona residential SRLs and GPLs.

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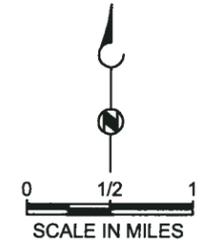
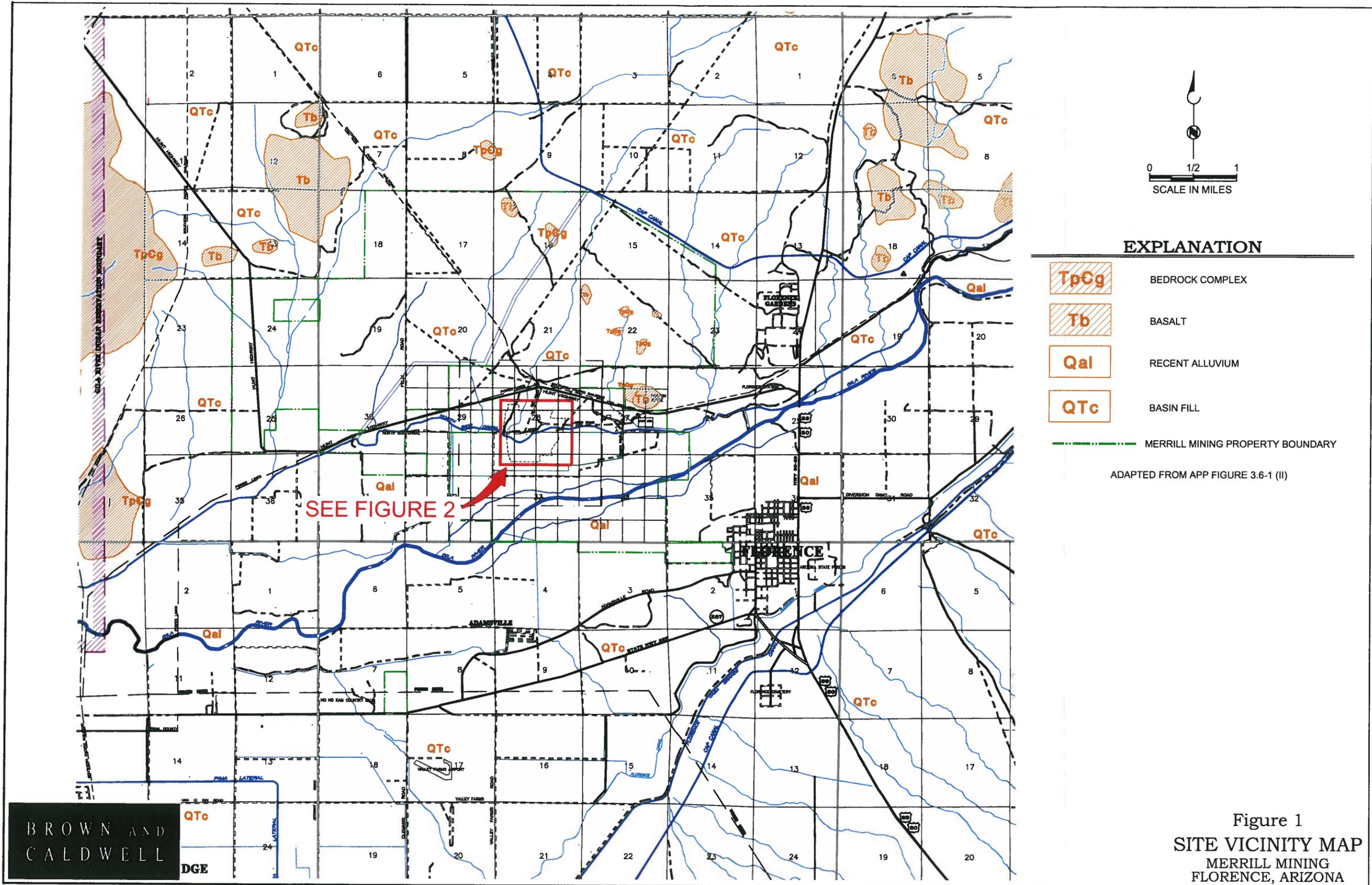
Based on the limited historical operations and extensive sampling/monitoring activities conducted to date at the Site, Florence Copper is proposing no additional investigation sampling for the Site and is requesting that ADEQ approve this Site for Clean Closure pursuant to A.R.S. §49-252(D). The activities summarized in this report were performed in accordance with the applicable regulatory guidelines and have been reported in multiple documents to satisfy the conditions of the APP and UIC permits.

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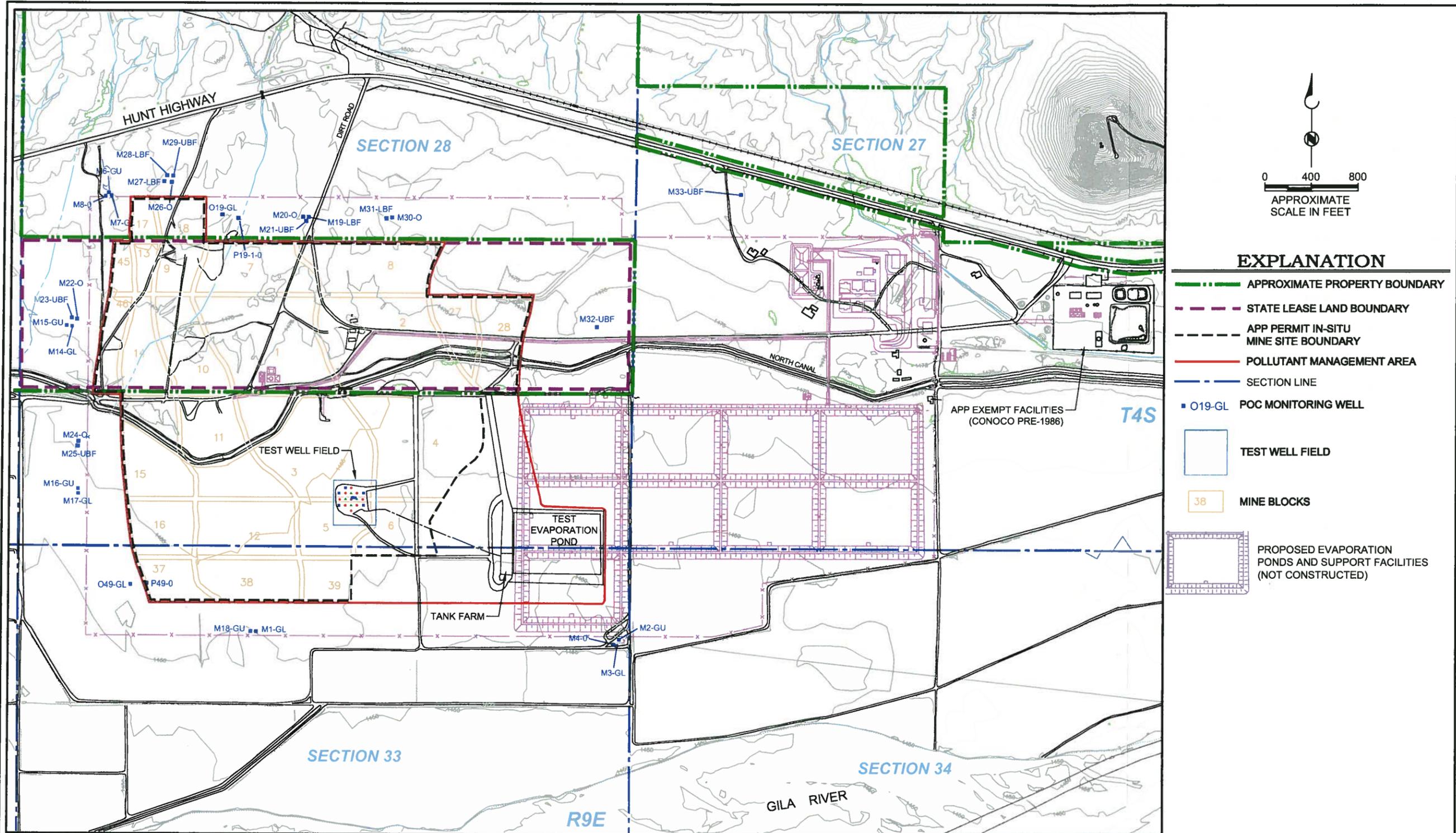
EXPLANATION

- TpCg BEDROCK COMPLEX
- Tb BASALT
- Qal RECENT ALLUVIUM
- QTc BASIN FILL
- MERRILL MINING PROPERTY BOUNDARY

ADAPTED FROM APP FIGURE 3.6-1 (II)

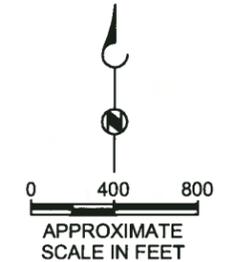
BROWN AND CALDWELL
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Figure 1
SITE VICINITY MAP
MERRILL MINING
FLORENCE, ARIZONA



EXPLANATION

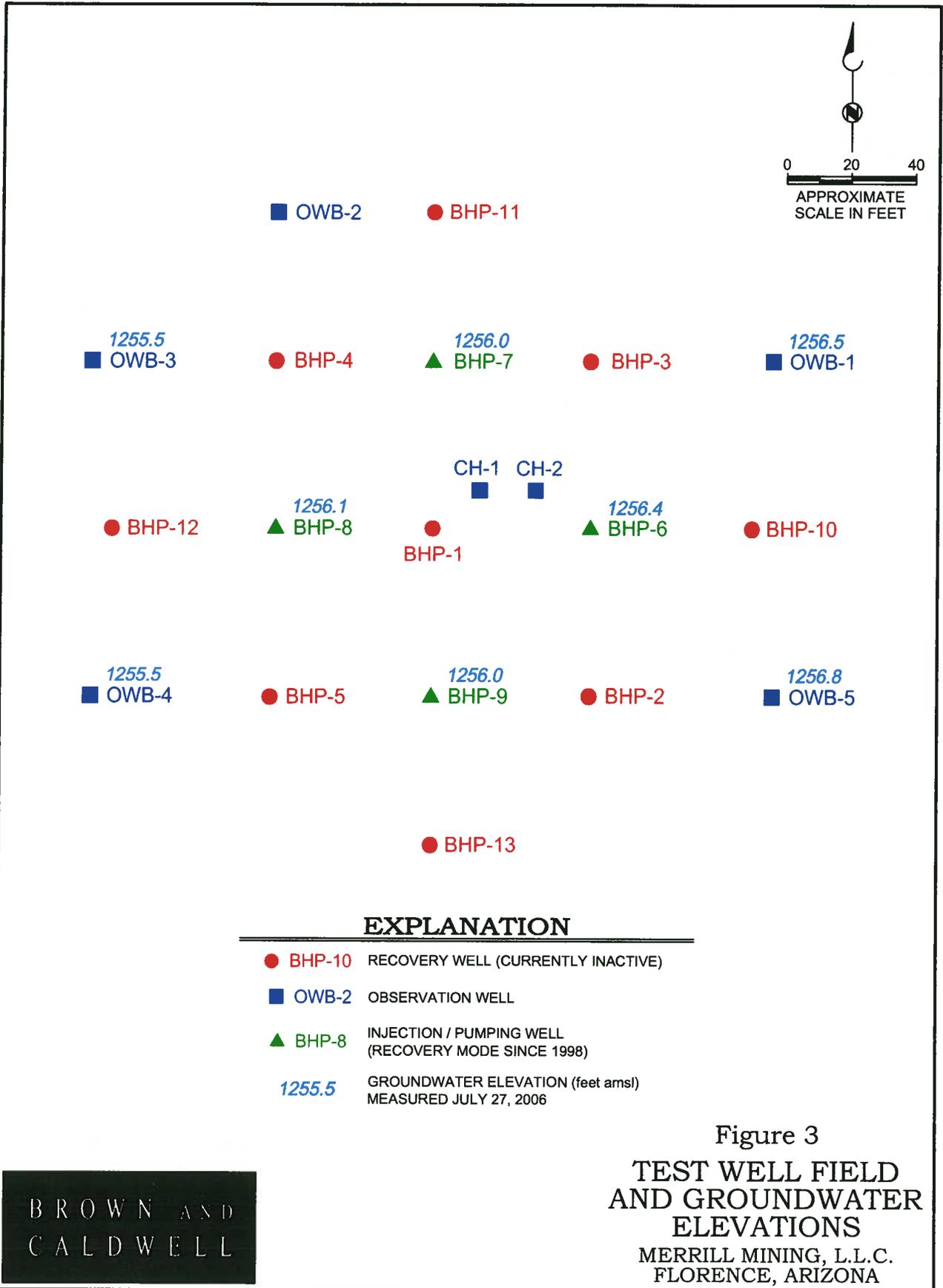
- - - - - APPROXIMATE PROPERTY BOUNDARY
- - - - - STATE LEASE LAND BOUNDARY
- - - - - APP PERMIT IN-SITU MINE SITE BOUNDARY
- - - - - POLLUTANT MANAGEMENT AREA
- - - - - SECTION LINE
- O19-GL POC MONITORING WELL
- TEST WELL FIELD
- MINE BLOCKS
- PROPOSED EVAPORATION PONDS AND SUPPORT FACILITIES (NOT CONSTRUCTED)



BROWN AND CALDWELL

Figure 2
SITE PLAN
 MERRILL MINING, L.L.C.
 FLORENCE, ARIZONA

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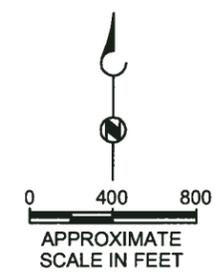
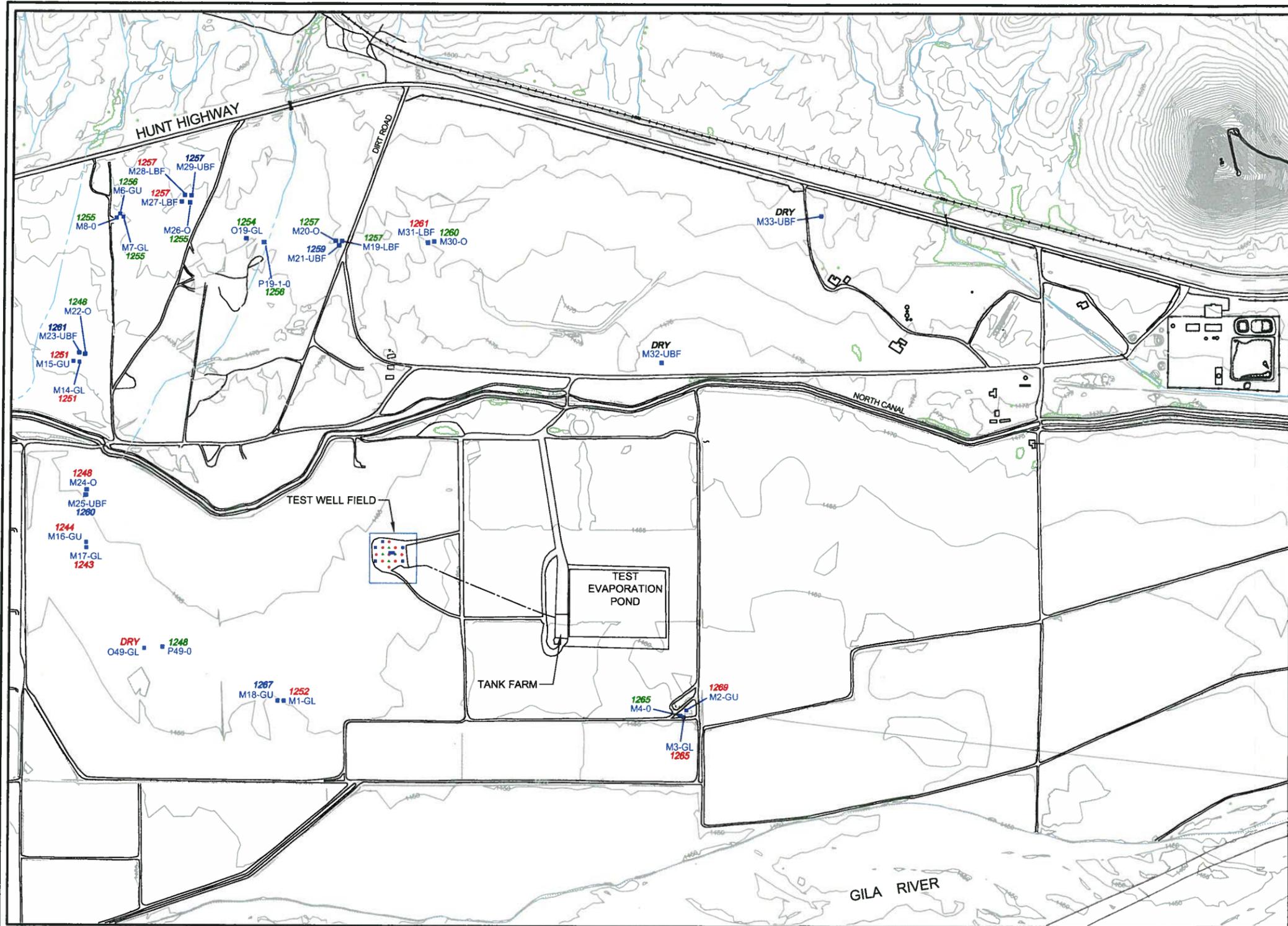


EXPLANATION

- BHP-10 RECOVERY WELL (CURRENTLY INACTIVE)
- OWB-2 OBSERVATION WELL
- ▲ BHP-8 INJECTION / PUMPING WELL (RECOVERY MODE SINCE 1998)
- 1255.5 GROUNDWATER ELEVATION (feet amsl) MEASURED JULY 27, 2006



Figure 3
**TEST WELL FIELD
 AND GROUNDWATER
 ELEVATIONS**
 MERRILL MINING, L.L.C.
 FLORENCE, ARIZONA



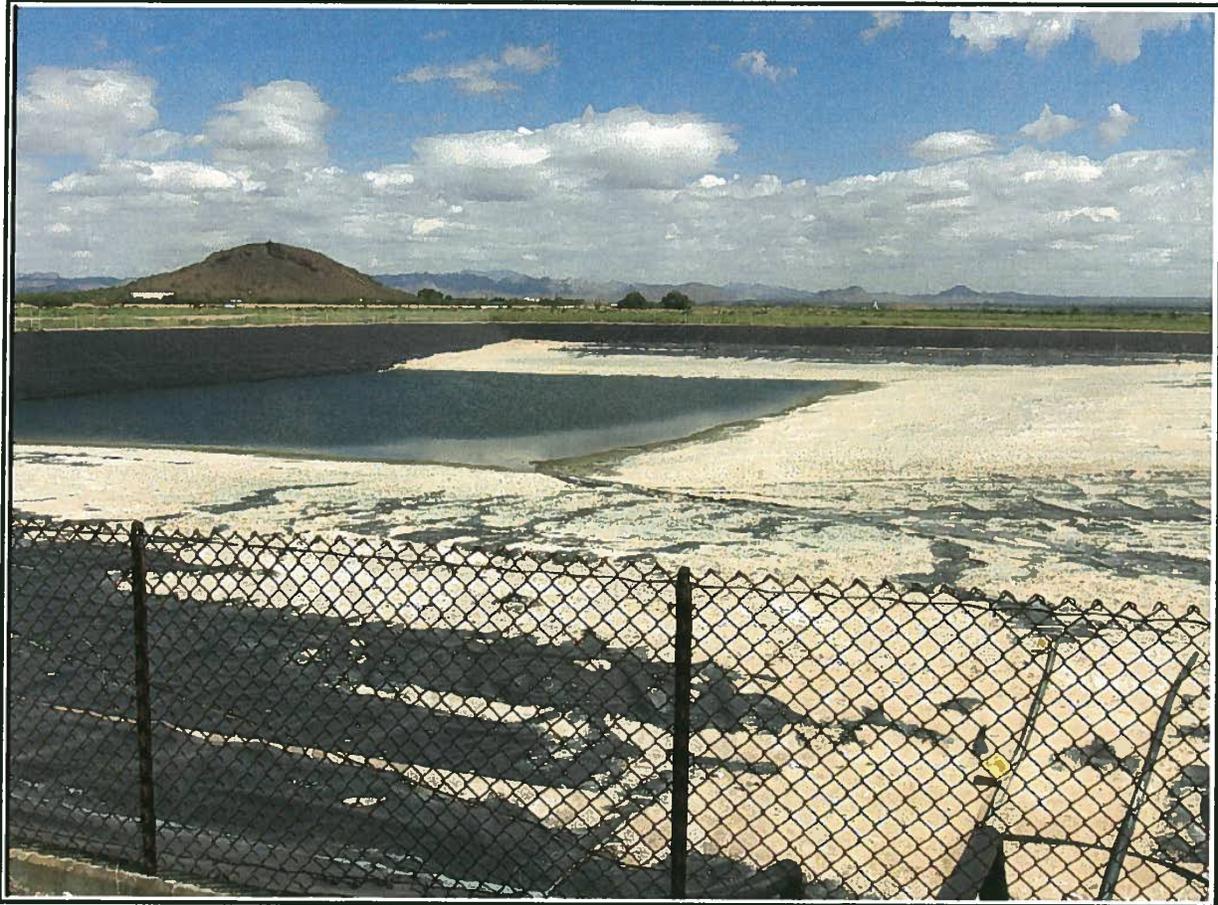
EXPLANATION

- APPROXIMATE PROPERTY BOUNDARY
- 1254 POC MONITORING WELL WITH GROUNDWATER ELEVATION (feet amsl)
- 019-GL
- 1265 LBF
- 1267 UBF
- 1260 OXIDE

BROWN AND CALDWELL

Figure 4
GROUNDWATER LEVEL ELEVATION MAP AS OF JULY 2006
 MERRILL MINING, L.L.C.
 FLORENCE, ARIZONA

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BROWN AND
CALDWELL

Figure 5
EVAPORATION POND
SEPTEMBER 2006
MERRILL MINING, L.L.C.
FLORENCE, ARIZONA

Site Investigation Plan
 Florence Copper In-Situ Mine Project
 Florence, Arizona

TABLE 1. WELL INVENTORY AND CONSTRUCTION DATA

WELL ID	WELL USE	CADASTRAL LOCATION / ADWR REG. NUMBER	LOCATION COORDINATE S (Northing Easting)	TOTAL DEPTH (feet)	CASING DIAMETER	SCREENED INTERVAL (feet)	DATE INSTALLED	AQUIFER SCREENED
MINE BLOCK TEST WELLS								
BHP-1	Recovery	D(4-9)28dcc	744922.98N 649371.54E	800	5"	380-740	10/18/1999	Oxide Bedrock Zone
BHP-2	Recovery	D(4-9)28dcc	744873.92N 649423.33E	894	5"	290-770	10/16/1997	Upper Basin-Fill unit
BHP-3	Recovery	D(4-9)28dcc	744975.74N 649419.51E	872	5"	0-860	10/14/1997	Oxide Bedrock Zone
BHP-4	Recovery	D(4-9)28dcc	744975.93N 649320.31E	834	5"	341-742	10/15/1997	Oxide Bedrock Zone
BHP-5	Recovery	D(4-9)28dcc	744877.17N 649321.97E	798	5"	375-776	10/15/1997	Oxide Bedrock Zone
BHP-6	Injection	D(4-9)28dcc	744923.1N 649420.2E	820	5"	385-805	2/11/1998	Oxide Bedrock Zone
BHP-7	Injection	D(4-9)28dcc	744924.0N 649371.9E	810	5"	400-760	2/11/1998	Oxide Bedrock Zone
BHP-8	Injection	D(4-9)28dcc	744923.6N 649320.75E	790	5"	400-780	8/24/2000	Oxide Bedrock Zone
BHP-9	Injection	D(4-9)28dcc	744874.3N 64937.2E	850	5"	400-840	2/12/1998	Oxide Bedrock Zone
BHP-10	Recovery	D(4-9)28dcc	744923.13N 649471.21E	837	5"	400-820	11/15/1997	Oxide Bedrock Zone
BHP-11	Recovery	D(4-9)28dcc	745026.26N 649370.5E	805	5"	385-805	4/22/1998	Oxide Bedrock Zone
BHP-12	Recovery	D(4-9)28dcc	744922.99N 649270.56E	770	5"	390-770	10/13/1997	Oxide Bedrock Zone
BHP-13	Recovery	D(4-9)28dcc	744824.0N 649370.6E	840	5"	386-826	10/13/1997	Oxide Bedrock Zone
OWB-1	Observation	D(4-9)28dcc	744975.9N 649470.8E	830	5"	395-795	3/4/1998	Oxide Bedrock Zone
OWB-2	Observation	D(4-9)28dcc	745026.2N 649321.1E	225	5"	200-220	7/3/2001	Upper Basin-Fill unit
OWB-3	Observation	D(4-9)28dcc	744976.4N 649270.5E	820	5"	396-796	3/4/1998	Oxide-Bedrock Zone
OWB-4	Observation	D(4-9)28dcc	744873.6N 649270.3E	755	5"	405-745	3/6/1998	Oxide-Bedrock Zone
OWB-5	Observation	D(4-9)28dcc	744873.9N 649470.9E	765	5"	405-765	3/5/1998	Oxide-Bedrock Zone
CH1	Observation	D(4-9)28dcc	744935.0N 649381.9E	789	5"	420-520 560-660 700-760		Oxide-Bedrock Zone
CH2	Observation	D(4-9)28dcc	744934.0N 649407.9E	775	5"	420-520 560-660 700-760		Oxide-Bedrock Zone

Site Investigation Plan
 Florence Copper In-Situ Mine Project
 Florence, Arizona

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WELL ID	WELL USE	CADASTRAL LOCATION / ADWR REG. NUMBER	LOCATION COORDINATE S (Northing Easting)	TOTAL DEPTH (feet)	CASING DIAMETER	SCREENED INTERVAL (feet)	DATE INSTALLED	AQUIFER SCREENED
POINT OF COMPLIANCE (POC) WELLS								
M1-GL	Monitor	D(4-9)33bac 55-547617	743799.85N 648550.02E	420	5"; 0-365	315-355	6/17/1995	Lower Basin-Fill Unit
M2-GU	Monitor	D(4-9)33bbc 55-547814	743737.92N 651658.43E	270	5"; 0-258	198-238	5/25/1995	Lower Basin-Fill Unit
M3-GL	Monitor	D(4-9)33bbc 55-547614	743685.56N 651636.79E	370	5"; 0-358.5	298-338	5/23/1995	Lower Basin-Fill Unit
M4-O	Monitor	D(4-9)33bbc 55-547615	743717.36N 651635.22E	510	5"; 0-485	405-465	5/21/1995	Oxide Bedrock Zone
M6-GU	Monitor	D(4-9)28bcc 55-547815	747556.46N 647256.92E	590	5"; 0-583	524-564	3/31/1995	Oxide Bedrock Zone
M7-GL	Monitor	D(4-9)28bcc 55-547611	747531.69N 647282.21E	940	5"; 0-592 4"; 592-928	859-919	4/6/1995	Oxide Bedrock Zone
M8-O	Monitor	D(4-9)28bcc 55-547612	747523.83N 647230.35E	1115	5"; 0-591 4"; 591-1091	1,011-1,071	4/12/1995	Oxide Bedrock Zone
M14-GL	Monitor	D(4-9)28cbc 55-549172	746414.71N 646961.20E	950	5"; 0-859	778-838	6/2/1995	Oxide Bedrock Zone
M15-GU	Monitor	D(4-9)28cbc 55-547813	746418.02N 646908.14E	630	5"; 0-615	554-594	6/6/1995	Lower Basin-Fill Unit
M16-GU	Monitor	D(4-9)28acc 55-549140	745025.42N 647017.35E	690	5"; 0-678	598-658	6/22/1995	Lower Basin-Fill Unit
M17-GL	Monitor	D(4-9)28ccc 55-549141	744976.80N 647017.02E	1130	5"; 0-1,018.5	938-998	6/18/1995	Oxide Bedrock Zone
M18-GU	Monitor	D(4-9)33bac 55-547809	743800.82N 648501.52E	240	5"; 0-228	178-218	6/18/1995	Lower Basin-Fill Unit
M19-LBF	Monitor	55-555828 D(4-9)28bdd	747381.53N 648971.7E	340	6.5	315-330	4/7/1996	Oxide Bedrock Zone
M20-O	Monitor	55-555829 D(4-9)28bdd	747382.65N 648921.15E	510	5.5	469-499	4/6/1996	Oxide Bedrock Zone
M21-UBF	Monitor	55-555823 D(4-9)28bdd	747330.58N 648967.06E	290	6.5	240-280	4/7/1996	Upper Basin-Fill unit
M22-O	Monitor	55-555831 D(4-9)28cbc	746467.66N 646962.22E	1150	5	932-1130	4/12/1996	Oxide Bedrock Zone
M23-UBF	Monitor	55-555824 D(4-9)28cbc	746465.67N 646899.09E	260	6.5	210-250	4/13/1996	Upper Basin-Fill unit
M24-O	Monitor	55-555832 D(4-9)28ccb	745415.84N 647027.49E	1282	5.5	1058-1259	5/6/1996	Lower Basin-Fill Unit
M25-UBF	Monitor	55-555825 D(4-9)28ccb	745464.57N 647018.87E	260	6.5	210-250	4/19/1996	Upper Basin-Fill Unit
M26-O	Monitor	55-555833 D(4-9)28bcd	747693.86N 647809.81E	1120	5	840-1038	4/23/1996	Oxide Bedrock Zone
M27-LBF	Monitor	55-555827 D(4-9)28bcd	747695.17N 647760.44E	455	6.5	376-435	4/25/1996	Lower Basin-Fill Unit
M28-LBF	Monitor	55-555834 D(4-9)28bcd	747746.97N 647751.71E	760	5	681-741	4/27/1996	Oxide Bedrock Zone
M29-UBF	Monitor	55-555830 D(4-9)28bcd	747748.1N 647819.42E	290	6.5	237-277	4/28/1996	Upper Basin-Fill Unit
M30-O	Monitor	55-555826 D(4-9)28add	747378.80N 649939.85E	575	6.5	387-555	4/30/1996	Oxide Bedrock Zone
M31-LBF	Monitor	55-556090 D(4-9)28add	747333.40N 649976.91E	320	6.5	.00-320	5/1/1996	Lower Basin-Fill Unit
M32-UBF	Monitor	55-556091 D(4-9)28dad	746415.17N 651458.96E	170	5.5	129-170	5/2/1996	Upper Basin-Fill Unit
M33-UBF	Monitor	55-556092 D(4-9)28bcd	747486.47N 652645.47E	170	5.5	130-170	5/3/1996	Upper Basin-Fill Unit
O19-GL	Observation	D(4-9)28bdc 55-549150	747359.29N 648233.62E	460	5"; 0-455	375-435	6/14/1995	Oxide Bedrock Zone
O49-GL	Observation	D(4-9)33bba 55-549180	744193.98N 647477.36E	740	5"; 0-730	661-721	6/15/1995	Lower Basin-Fill Unit
P19.1-O	Test	D(4-9)28bdc 55-549151	747345.78N 648427.94E	680	6"; 0-621	402-600	6/4/1995	Oxide Bedrock Zone
P49-O	Test	D(4-9)33bba 55-549181	744202.71N 647611.87E	1288	6"; 0-1242.5	808-1222	5/24/1995	Oxide Bedrock Zone

Site Investigation Plan
 Florence Copper In-Situ Mine Project
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TABLE 1. WELL INVENTORY AND CONSTRUCTION DATA

WELL ID	WELL USE	CADASTRAL LOCATION / ADWR REG. NUMBER	LOCATION COORDINATE S (Northing Easting)	TOTAL DEPTH (feet)	CASING DIAMETER	SCREENED INTERVAL (feet)	DATE INSTALLED	AQUIFER SCREENED
NON-POC WELLS								
OB-1 (OW-1, OBS-1, OB-1 Conoco)	Observation	D(4-9)28cda aka:D(4-9)28cda3	745613.75N 648660.86E	1498	5"; 0-1,035	470-1,035	1972	
OB-2 (OW-2, OB-2 Conoco)	Observation	D(4-9)28cad aka:D(4-9)28cad1	745947.97N 649003.90E	1600	8"; 0-295 5"; 295-1,030	285-1,030	1972	
OB-4	Observation	D(4-9)28ddb	745194.72N 650636.16E	350	3"	160-340	NA	
OB-5	Observation	D(4-9)28cda	745115.23N 649038.11E	350	3"	160-340	NA	
OB-6	Observation	D(4-9)28cad	746472.00N 648486.00N		4"			
OB1-1	Observation	D(4-9)28caa 648750.08E	746428.25N 648750.08E	760	4"	360-740	1994	
OB2-1	Observation	D(4-9)28dbc aka:D(4-9)28dbd	746157.89N 649563.89E	640	4"	400-620	1994	
OB2-2	Observation	D(4-9)28dcb 649879.13E	745500.7N 649879.13E	800	4"	460-760	1994	
OB3-1	Observation	D(4-9)28cbb 647890.16E	746204.02N 647890.16E	800	4"	500-780	1994	
OB4-1	Observation	D(4-9)28cca 647783.01E	745584.31N 647783.01E	800	4"	440-780	1994	
OB7-1	Observation	D(4-9)28cda 648872.17E	745455.55N 648872.17E	900	4"	540-880	1994	
PW1-1	Test	D(4-9)28caa 648742.16E	746476.50N 648742.16E	760	6"	360-740	1994	
PW2-1	Test	D(4-9)28dbc aka:D(4-9)28dbd	746199.14N 649536.12E	640	6"	400-620	1994	
PW2-2	Test	D(4-9)28dcb 649854.34E	745543.15N 649854.34E	800	6"	460-760	1994	
PW3-1	Test	D(4-9)28cbb 647873.55E	746250.70N 647873.55E	800	6"	500-780	1994	
PW4-1	Test	D(4-9)28cca 647769.65E	745530.80N 647769.65E	800	6"	440-780	1994	
PW7-1	Test	D(4-9)28cda 648823.52E	745467.86N 648823.52E	900	6"	540-880	1994	
DM-A	Test	D(4-9)28cad aka:D(4-9)28cad2	746381.80N 649148.51E	700	5"; 0-382	NA	NA	
DM-B	Test	D(4-9)28cac 55-806521	746381.71N 648246.90E	700	5"; 0-611 4"; 611-700	NA	NA	
DM-C	Test	D(4-9)28dbd 55-806520 aka:D(4-9)28dbd1	746384.92N 650185.43E	610	5"; 0-358	NA	1974	
DM-D	Test	D(4-9)28dba aka:D(4-9)28dbd	746842.25N 649740.28E	635	5"; 0-364	NA	NA	
DM-E	Test	D(4-9)28ddb 650741.49E	745516.10N 650741.49E	700	5"; 0-392	NA	NA	
D(4-9)27dbb	Unknown	unknown	746486.00N 654444.00E	NA	6"	NA	NA	
M5-S	Monitor	D(4-9)33bbc 55-547616	743719.46N 651685.49E	613	5"; 0-5164"; 516-597	516-576	5/18/1995	Sulfide Bedrock Zone
M9-S	Monitor	D(4-9)28bcc 55-547613	747555.92N 647207.61E	1578	5"; 0-502 4"; 502-1570	1,510-1,570	3/23/1995	Sulfide Bedrock Zone
M10-GU	Monitor	D(4-9)28dcb 55-547816	745467.53N 649798.29E	290	5"; 0-268	218-258	5/10/1995	Upper Basin-Fill unit

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NON-POC WELLS (continued)								
M11-GL	Monitor	D(4-9)28dcb 55-547817	745471.70N 649749.77E	370	5"; 0-350	290-330	5/9/1995	Lower Basin-Fill Unit
M12-O	Monitor	D(4-9)28dcb 55-547818	745506.14N 649798.24E	510	5"; 0-501	420-480	5/6/1995	Oxide Bedrock Zone
M13-S	Monitor	D(4-9)28dcb 55-547819	745507.59N 649748.96E	943	5"; 0-931	851-911	4/25/1995	Sulfide Bedrock Zone
O3-GL	Observation	D(4-9)28cda 55-549153	745444.25N 648922.36E	395	5"; 0-385	325-365	5/11/1995	Lower Basin-Fill Unit
O5.1-O	Observation	D(4-9)28dcc 55-549144	744718.01N 649599.80E	880	5"; 0-494 4"; 494-853	674-832	5/25/1995	Oxide Bedrock Zone
O5.2-O	Observation	D(4-9)28dcc 55-549145	744701.23N 649524.74E	880	4"; 0-792	712-771	5/20/1995	Oxide Bedrock Zone
P5-O	Test	D(4-9)28dcc 55-549147	744696.96N 649499.22E	800	6"; 0-790	414-454 473-513 533-572 592-632 671-691 711-730 750-770	5/22/1995	Oxide Bedrock Zone
O8-O	Observation	D(4-9)28dbb 55-549164	74690312N 649393.299E	610	4"; 0-599.5	401.5-579	8/26/1995	Oxide Bedrock Zone
O8-GU	Observation	D(4-9)28dbb 55-549165	746792.74N 649386.23E	270	4"; 0-261	133-251	8/16/1995	Oxide Bedrock Zone
P8.1-O	Test	D(4-9)28dbb 55-549166	746793.36N 649403.82E	616	6"; 0-600	399.5-580	8/14/1995	Oxide Bedrock Zone
P8.2-O	Test	D(4-9)28dbb 55-549166	746863.66N 649289.85E	610	6"; 0-596.5	396-576	8/23/1995	Oxide Bedrock Zone
P8-GU	Test	D(4-9)28dbb 55-549167	746846.80N 649293.48E	270	6"; 0-259	128-248	8/25/1995	Upper Basin-Fill unit
O12-O	Observation	D(4-9)28cdc 55-549169	744745.55N 648411.81E	970	4"; 0-950	434-929	5/18/1995	Oxide Bedrock Zone
O12-GL	Observation	D(4-9)28cdc 55-549170	744739.89N 648436.70E	395	5"; 0-385	325-365	5/11/1995	Lower Basin-Fill Unit
P12-O	Test	D(4-9)28cdc 55-549171	744708.34N 648473.26E	999	6"; 0-960	440-940	5/9/1995	Oxide Bedrock Zone
O13-O	Observation	D(4-9)28cba 55-547812	746889.92N 647598.55E	1440	4"; 0-1413	770-1,393	8/2/1995	Oxide Bedrock Zone
P13.2-O	Test	D(4-9)28cba 55-547810	746807.64N 647653.82E	1400	6"; 0-1380	781-1,379	7/27/1995	Oxide Bedrock Zone
P13.1-O	Test	D(4-9)28cba 55-547808	746799.40N 647551.22E	1475	6"; 0-1449	772-1,449	7/16/1995	Oxide Bedrock Zone
P13-GL	Test	D(4-9)28cba 55-547811	746802.29N 647400.14E	770	6"; 0-760	690-760	8/11/1995	Lower Basin-Fill Unit
O15-O	Observation	D(4-9)28cca 55-549160	745437.85N 647505.19E	1330	4"; 0-1,315	632-1,296	7/1/1995	Oxide Bedrock Zone
P15-O	Test	D(4-9)28cca 55-549158	745428.58N 647596.44E	1380	6"; 0-1321	580-1300	6/20/1995	Oxide Bedrock Zone
P15-GL	Test	D(4-9)28cca 55-549161	745376.92N 647508.44E	500	6"; 0-491	421-481	7/3/1995	Lower Basin-Fill Unit
O19-O	Observation	D(4-9)28bdc 55-549149	747413.63N 648397.07E	630	4"; 0-627	410-608	6/7/1995	Oxide Bedrock Zone
P19.2-O	Test	D(4-9)28bdc 55-549152	747350.40N 648359.48E	630	6"; 0-622	404-602	6/8/1995	Oxide Bedrock Zone
O28-GL	Observation	D(4-9)28ddb 55-547805	745592.65N 650966.70E	320	4"; 0-307	277-307	7/4/1995	Lower Basin-Fill Unit
O28.1-O	Observation	D(4-9)28ddb 55-547803	745652.04N 651027.87E	530	4"; 0-514	395-494	6/21/1995	Oxide Bedrock Zone
O28.2-S	Observation	D(4-9)28ddb 55-547804	745621.06N 651123.95E	510	4"; 0-495	454-494	6/19/1995	Oxide Bedrock Zone

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 Florence Copper In-Situ Mine Project
 Florence, Arizona

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WELL ID	WELL USE	CADASTRAL LOCATION / ADWR REG. NUMBER	LOCATION COORDINATE S (Northing Easting)	TOTAL DEPTH (feet)	CASING DIAMETER	SCREENED INTERVAL (feet)	DATE INSTALLED	AQUIFER SCREENED
NON-POC WELLS (continued)								
P28-GL	Test	D(4-9)28ddb 55-547807	745535.76N 651085.74E	320	5"; 0-309	279-309	6/30/1995	Lower Basin-Fill Unit
P28.1-O	Test	D(4-9)28ddb 55-547802	745558.54N 650998.31E	520	6"; 0-509	399-499	7/2/1995	Oxide Bedrock Zone
P28.2-O	Test	D(4-9)28ddb 55-547806	745516.17N 651118.23E	519	6"; 0-507	398-497	6/29/1995	Oxide Bedrock Zone
O39-O	Observation	D(4-9)28bcd 55-549174	744220.52N 649098.12E	916	5"; 0-910	474-890	5/7/1995	Oxide Bedrock Zone
P39-O	Test	D(4-9)28bcd 55-549176	744102.51N 649102.65E	915	6"; 0-847	471-826	5/10/1995	Oxide Bedrock Zone
O49-O	Observation	D(4-9)33bba 549179	744195.29N 647517.19E	1280	4"; 0-1247	832-1227.5	6/6/1995	Oxide Bedrock Zone

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WELL ID	WELL USE	CADASTRAL LOCATION / ADWR REG. NUMBER	LOCATION COORDINATE S (Northing Easting)	TOTAL DEPTH (feet)	CASING DIAMETER	SCREENED INTERVAL (feet)	DATE INSTALLED	AQUIFER SCREENED
IRRIGATION AND OTHER WELLS (NOT TO BE CLOSED)								
Supply Well 1 (Magma Supply)	Irrigation	D(4-9)27cad 55-627614	745868.98 N654275.22E	500	20"; 0-290 16"; 290-500	62-490	3/25/1962	
Supply Well 2 (Farm Supply)	Domestic	D(4-9)27cac 55-627613 aka:D(4-9)27cab	746414.26N 653019.03E	305	10"	203-295	2/3/1955	
D(4-9)27bbd	Recharge	D(4-9)27bbd 55-627646	NA	765	6"; 0-765	NA	8/15/1977	
D(4-9)27cbd		D(4-9)27cbd 55-627656 aka:27cbd2	745976.72N 652973.87E					
D(4-9)28cbc	Monitor	D(4-9)28cbc	746208.00N 646722.00E	NA	5"	NA	NA	
D(4-9)29dab	Industrial	D(4-9)29dab 55-609666		1,625	7"; 0-1,600	NA	8/25/1971	
D(4-9)29dac	Industrial	D(4-9)29dac 55-609667		1,098	11"; 0-1,098	NA	7/31/1971	
MF2 (MF-Y)	Irrigation	D(4-9)28cdb 55-627641	745425.00N 647830.00E	520	20"	NA	1961	
MF3 (MF-X)	Irrigation	D(4-9)32ada 55-627604	743140.00N 646505.00E	473	20"; 0-265 16"; 265-473	100-473	1961	
England 3	Irrigation	D(4-9)27cbd 55-627612 aka: D(4-9)27cbd1D(4-9)27cbdd	746050.00N 652800.00E	410	20"; 0-410	210-400	1961	
OB-3 (McFarland 1,OW-3,Mf H20, MFZ)	Irrigation	D(4-9)28cda 55-627640 aka:D(4-9)28cda1 D(4-9)28cdab	745695.00N 648536.00E	560	20"; 0-260 16"; 260-560	75-560	7/6/1963	
PW-1 (Conoco 1, WW-1)	Industrial	D(4-9)28dbd 55-627606 aka:D(4-9)dbd2	746030.00N 650070.00E	949	18"; 0-540 14"; 540-937	243-947	12/2/1974	
PW-2 (Conoco 2)	Industrial	D(4-9)28cab 55-627607 aka:D(4-9)28cabD(4-9)28hdc	747070.00N 647940.00E	981	18"; 0-621 14"; 621-981	234-981	1/29/1975	
PW-3 (Conoco 3, WW-3)	Irrigation	D(4-9)28cdb 55-627608 aka:D(4-	745591.29N 647985.08E	938	18"; 0-496 14"; 496-936	240-933	11/21/1974	
PW-4 (Conoco 4, WW-4)	Irrigation	D(4-9)33aad 55-627609 aka:D(4-9)33aada	743778.00N 651583.00E	997	18"; 0-598 14"; 598-997	252-997	12/15/1974	
PW-20 (Conoco 20)	Irrigation	D(4-9)29dca55-627610	745370.00N 644620.00E	1180	18"; 0-1176	229-1,176	1975	
Airshaft (North Shaft)	Test	D(4-9)28dbc aka:D(4-9)28dbc1	746460.43N 649349.76E	706	42"; 0-700	NA	1974	
Shaft No. 1 (South Shaft)	Test	D(4-9)28dbc aka:D(4-9)28dbc2	746374.85N 649349.49E	730	72"; 0-715	NA	1974	

Site Investigation Plan
 Florence Copper In-Situ Mine Project
 Florence, Arizona

TABLE 1. WELL INVENTORY AND CONSTRUCTION DATA

WELL ID	WELL USE	CADASTRAL LOCATION / ADWR REG. NUMBER	LOCATION COORDINATE S (Northing Easting)	TOTAL DEPTH (feet)	CASING DIAMETER	SCREENED INTERVAL (feet)	DATE INSTALLED	AQUIFER SCREENED
IRRIGATION AND OTHER WELLS (NOT TO BE CLOSED) (continued)								
84	Exploration Borehole	D(4-9)28add	747250.00N 651188.00E	340	3"	NA	NA	
BIA 9	Irrigation	D(4-9)28cca 55-621948 aka:D(4-9)28cca2 D(4-9)28cdb	745732.41N 647305.26E	500	20"; 0-254 16"; 254-495	80-495	NA	
BIA 10B	Irrigation	D(4-9)28cda 55-621949 aka:D(4-9)28cda2	745638.16N 649114.65E	2006	20"; 0-909 13"; 909-1,909	200-1,909	8/15/1972	
BIA-10	Irrigation	D(4-9)28dad aka:D(4-9)27cac	746222.00N 651764.00E	259	20"; 0-259	107-247	4/16/1934	